BOTANICAL ABSTRACTS

A monthly serial furnishing abstracts and citations of publications in the international field of botany in its broadest sense.

UNDER THE DIRECTION OF

THE BOARD OF CONTROL OF BOTANICAL ABSTRACTS, INC.

J. R. Schramm, Editor-in-Chief
National Research Council, Washington, D. C.

Vol. X — FEBRUARY, 1922 — No. 4

ENTRIES 1447–2066

AGRONOMY

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(See also in this issue Entries 1545, 1663, 1667, 1703, 1739, 1828, 1885, 1887, 1893, 1929, 1963, *1976, 1980, 1983, 1984, 1988, 1995*)

1447. Anonymous. Agricultural research. Nature 107: 731–732. 1921.—This is an abstract of an address, by Sir Daniel Hall at the Royal Society of Arts, dealing with agricultural organization in Great Britain.—*O. A. Stevens.*

1448. Anonymous. **Berichte der höheren staatlichen Gärtnerlehranstalt zu Dahlem, der höheren staatlichen Lehranstalt für Wein-, Obst- und Gartenbau zu Geisenheim a. Rh. und der höheren staatlichen Lehranstalt für Obst- und Gartenbau zu Proskau für die Rechnungsjahre 1918 und 1919. [Reports of the higher government gardeners school at Dahlem; of the higher government school for vineyard, fruit, and garden culture at Geisenheim on the Rhine, and the higher government school for fruit and garden culture at Proskau for the fiscal years 1918 and 1919.]** Landw. Jahrb. 56: Ergänzungsband I. *337 p.* 1921.—There are separately paged reports from each of the above institutions, carrying respectively 76, 147, and 114 pages. In addition to financial and other administrative reports there are brief statements regarding practical and scientific investigations in vineyard, orchard, and garden culture, plant physiology and pathology, soil science, genetics, etc.—*A. J. Pieters.*

1449. Anonymous. **Cultivation and fertilizing. Bundaberg Field Day.** Australian Sugar Jour. 13: 215–216. 1921.—A report is given of the experiments in operation at Margam, the local experiment station at Bundaberg. These demonstrated that in that region cane planted close together in rows 5 feet apart gave the greatest tonnage in comparison with (the same variety being used and the same treatment given) cane planted 6 and 7 feet apart. In connection with fertilizing, as far as this district is concerned, liming of the red soils had not shown adequate results either in the growth or the value of the cane produced. One plot to which green manure and 1 ton of lime had been applied produced at the end of 24 months a crop of 16.77 tons of D. 1135 cane per acre containing 2.39 tons C. C. S. (cured centrifugal sugar). Another plot, to which lime but no green manure had been given, yielded 15.88 tons of cane per acre, equaling 2.09 tons C. C. S. A 3rd plot, receiving neither lime nor green manure, gave 19.42 tons of cane, equivalent in sugar yield to 2.98 tons C. C. S.—*C. Rumbold.*

1450. Anonymous. **Falsificación de la semilla de alfalfa.** [Adulteration of alfalfa seed.] Bol. Agric. Provincia Buenos Aires 1^6: 3–4. 1920.—Warning is given that alfalfa seed may be adulterated with seed of a weed, *Medicago denticulata*.—*John A. Stevenson.*

1451. Anonymous. **El pochote y su cultivo.** [Kapok cultivation.] Jalisco Rural 3: 441–445. 1921.—The cultivation and harvesting of kapok (*Ceiba* sp.) are discussed.—*John A. Stevenson.*

1452. Anonymous. **Grass and cotton.** Sci. Amer. Monthly 3: 62. 1921. [Abstract of an article in Color Trade Journal, Aug., 1920.]—This article tells of a Japanese grass, *Phyllospadix Scouleri*, used for fiber, which, mixed with cotton, makes a very strong thread.—*Chas. H. Otis.*

1453. Anonymous. **Notes on some South African raw materials. Products of farm and veld.** South African Jour. Indust. 4: 359–371. 1921.—Excepting the baobab and possibly the wattle, South Africa has no trees suitable and in sufficient quantities for paper making, but a number of grasses have been found suitable. These are *Cymbopogon hirtus*, *Themeda forskalii* var. *mollissima* Hack, Tambookie grass, *Sorghum halepense*, and *Andropogon hirtiflorus*. The chief fiber plants grown in the Union are *Cannabis sativa*, *Hibiscus cannabinus*, *Furcroya gigantea*, *Asclepias fruticosa*, *Sida rhombifolia*, *Sparmannia*, and *Sisal*. Possible sources of oils, waxes, gums, vegetable dyes, drugs, industrial alcohol, and tanning materials are also mentioned.—*E. M. Doidge.*

1454. Anonymous. **Trigos para simientes.** [Seed wheat.] Rev. Soc. Rural Cordoba [Argentina] 20: 4979–4989. 1920.—This is a discussion of the varieties of wheat adapted to Argentina.—*J. A. Stevenson.*

1455. Arana, Marcelino de. **Praderas artificiales en secano.** [Artificial pastures for unirrigated lands.] Bol. Agric. Téc. y Econ. [España] 12: 362–366, 433–435. 1920.—Alfalfa and other legumes are recommended for planting on dry lands.—*John A. Stevenson.*

1456. Arnim, von. **Vorrichtung zum Beizen des Saatgetreides.** [Apparatus for treating seed grain.] Mitteil. Deutsch. Landw. Ges. 36: 563–564. 1921.—The author calls attention to the fact that the various forms of apparatus for treating seed grain now on the market are expensive; he suggests a simpler form, which is described and illustrated.—*A. J. Pieters.*

1457. Baker, E. **Hop growing experiments in South Africa.** Jour. Dept. Agric. Union of South Africa 3: 27–43. *Pl. 1–14.* 1921.—Experiments in hop growing carried out at George during the past 3 years are described. It may now be definitely stated that hops can be grown satisfactorily in at least one part of South Africa and that hop growing may possibly develop into a staple industry.—*E. M. Doidge.*

1458. Balme, Juan. **No es indiferente elegir cualquier variedad de trigo para semilla.** [Use care in selecting a wheat variety for planting.] Rev. Agric. [Mexico] 6: 140–142. *4 fig.* 1921.—The importance of selecting a variety of wheat adapted to the locality in which it is to be grown is emphasized.—*John A. Stevenson.*

1459. Bornemann, O. Lemmermann, Gerlach, und Friedr. Riedel. **Zur Kohlenstoffernährung der Kulturpflanzen.** [Concerning carbon nutrition of cultivated plants.] Mitteil. Deutsch. Landw. Ges. 36: 481–485, 496–498. 1921.—This is a presentation of the different views of the authors on this subject. All agree that an increase in the CO_2 content of the atmosphere results in increased plant growth. Bornemann, however, contends that stable and green manure turned under in spring rather than in fall results in larger yields because of the increased CO_2 content. Lemmermann cites several experimente to show that the best time to turn under stable and green manure varies with the character of soil, spring plowing giving best yields on light soils, while on heavy soils greater yields may be expected from fall plowing. This he attributes in part to the more speedy nitrification on light soils and the

subsequent loss of the nitrates. Lemmermann also points out that where artificial fertilizers were used no additional effect was shown by the use of stable manure, as would be expected if CO_2 influenced the yield. He insists that Bornemann's contention that stable and green manures increase the CO_2 content and that this factor is to be credited with the increased yields has not been proved by any accurate experiments. Riedel, an engineer, describes the pronounced effect of CO_2 fertilizing in greenhouses, and discusses the possibility of using waste gases as cheap sources of CO_2. [See also Bot. Absts. 7, Entries 626, 1304; 8, Entries 12, 32; 9, Entry 540.]—*A. J. Pieters.*

1460. Bovet, Pedro A. **Apuntes sobre Phalaris bulbosa o mata de gramilla dulce. [Notes on Phalaris bulbosa.]** Bol. Agric. Provincia Buenos Aires 1⁷: 3–14. *9 fig.* 1920.—Experiments were conducted to test the availability of *Phalaris bulbosa* as a forage crop in the dry and unirrigated sections of the province of Buenos Aires, where the rainfall is less than 310 mm. per annum. Seedings failed to live through the dry period, but cuttings were more successful.—*John A. Stevenson.*

1461. Bovet, Pedro A. **Ensajo de cultivo de kafir, feterita y milo (1917–18). [Experiments in 1917–18 with kafir, feterita, and milo.]** Bol. Agric. Provincia Buenos Aires 1^8: 9–14. *2 fig.* 1920.—Experiments have been conducted with kafir, feterita, and milo to test their adaptability to the dry conditions prevailing in the province of Buenos Aires.—*John A. Stevenson.*

1462. Bruno, Albert. **La toxicité du borax pour les végétaux. Note critique. [The toxicity of borax for plants. Critical note.]** Ann. Sci. Agron. Française et Etrangère 37: 185–190. 1920.—The author briefly reviews American literature bearing on the subject, calling attention especially to the work of Conner [see Bot. Absts. 6, Entry 1381], Schreiner and Skinner [see Bot. Absts. 6, Entry 1431], and their co-workers. He states that their results are contrary to those obtained in various researches in France as shown in the work of Bertrand and Rivière and Bailhache. Admitting that the method of incorporation of the fertilizer in the soil is a factor affecting its toxicity, the author suggests that the Americans made an initial mistake in experimenting only with the Searles Lake salts, which he thinks may contain some substance more toxic than borax. In conclusion these investigations with borax-containing fertilizers are cited as new proof of the great difficulties confronting investigators of plant physiological problems.—*A. B. Beaumont.*

1463. Calvino, Eva Mameli de. **Estudios anatomicas y fisiologicos sobre la caña de azucar en Cuba. [Anatomical and physiological studies of sugar cane in Cuba.]** Estac. Exp. Agron. [Cuba] Bol. 46. *49 p., 21 fig.* 1921.—The author gives briefly the history of the production of new varieties of sugar cane from true seed, including the work done to date by the experiment station. The methods originated in Java, India, and elsewhere for obtaining fertile seed are discussed. Varieties Uba, Cristalina, and C291 are described, and histological details by which the 3 may be distinguished are given. Humidity, soil moisture, and other factors which may influence the time of flowering are discussed. The presence of starch grains in the pollen indicates normal condition. Several crosses were made and seedlings grown from the resulting seed.—*John A. Stevenson.*

1464. Calvino, Mario. **Informe de los años 1918–1919 y 1919–1920 de la estación experimental agronomica. [Report of the agricultural experiment station for 1918–1919 and 1919–1920.]** Informe An. Estac. Exp. Agron. [Cuba] 1918–1920: 1–786. *329 fig.* 1920.—The work reported includes varietal and cultural tests with the following plants: potatoes, maize (native and Mexican varieties), rice, wheat, buckwheat, milo, *Eleusine coracana*, many varieties of soy beans, *Dolichos lablab*, *Canavali* spp., velvet beans, cow peas, pigeon peas. *Pennisetum purpureum*, *Meibomia leiocarpa*, *Tripsacum latifolium*, *Paspalum dilatatum*, *Ixophorus unisetus*, *Solanum verbascifolium*, Peruvian alfalfa, cotton, tobacco, and sugar cane. Studies were made of the oil-producing capacities of peanut, castor bean, and *Salvia hispanica*, and the fiber-producing qualities of *Meibomia leiocarpa*, *Spartium junceum*, and *Hibiscus sabdariffa* var. *altissima*.—*John A. Stevenson.*

1465. Correa Mendes, F. C. **Relatorio de alguns serviços mais importantes a cargo da Direcção dos Serviços Agricolas, e Florestais, 1919–20.** [**Report of the Director of the agricultural and forestry service.**] Bol. Agric. [Nova Goa] 2: 28–61. 1920.—The author outlines the activities of the agricultural and forestry service, the most important feature of which is an extensive plan for encouraging the cotton industry.—*John A. Stevenson.*

1466. Cross, W. E. **Distancia a que debe plantarse la caña de azucar.** [**Planting distance for sugar cane.**] Rev. Indust. y Agric. Tucuman 10: 87–100. 1919.—As a result of 3 and 4 year tests with a number of varieties of sugar cane the author concludes that to secure most economically the greatest quantity of sugar per hectare the distance between rows ought to be the minimum distance which permits of convenient cultivation with modern cultivation machines. This distance is 1.5–1.8 m.—*John A. Stevenson.*

1467. Cross, W. E. **El deterioro de las cañas cortadas.** [**Deterioration of cut cane.**] Rev. Indust. y Agric. Tucuman 10: 54–55. 1919.—The necessity of milling the Javan varieties of cane as soon as possible after cutting is emphasized. A delay of 3–5 days is permissible in cool weather, but the time should be shortened beginning with September.—*John A. Stevenson.*

1468. Cross, W. E. **El problema de la caña no molida.** [**The problem of unmilled cane.**] Rev. Indust. y Agric. Tucuman 10: 42–45. 1919.—Wet weather and other conditions often make it impossible to mill all available cane in a given season. Experiments were conducted to ascertain the effect of leaving cane in the field for 2 seasons. During the seasons 1911–13 and 1916–18 the varieties Kavangire, POJ313, 234, 36, and 228 did not suffer any loss in sucrose or purity, and continued to grow during the 2nd season. The ratooning power of the stools was not injured.—*John A. Stevenson.*

1469. Cross, W. E. **El tratamiento de la caña dañada por las heladas.** [**Treatment of cane injured by freezing.**] Rev. Indust. y Agric. Tucuman 10: 143–153. 1920.—Temperatures of −2 to −26°C. in July, 1919, injured cane in Tucuman. Varieties Rose Bamboo and B208 showed practically no resistance, Java 228 and 108 were somewhat more resistant, and Java 36, 213, and 234 were very notably resistant. Decomposition of several types (*Leuconostoc* and other organisms) may follow freezing. Under Tucuman conditions it is best to leave frozen cane in the fields until cut, but cutting as soon as possible. In the mill great care must be exercised in handling the juice. Cleanliness is essential to prevent further fermentation. Cane too badly fermented for grinding can be used for alcohol or for fuel.—*John A. Stevenson.*

1470. Cross, W. E. **Informe anual del año 1918.** [**Report for 1918.**] Rev. Indust. y Agric. Tucuman 10: 1–30. *6 fig.* 1919.—Various crops were tested as to availability for replacing cane, in which over production is threatened. Both native and Javan cane seedlings were studied. Other sugar cane work included irrigation experiments, fertilizer tests, planting methods, distance of planting, and the effect of freezing. A number of cane varieties are described. Tests were made with spineless cactus, the Dahomey variety of sweet potato, and with cotton. Varietal tests with tomatoes and citrus were also carried out.—*John A. Stevenson.*

1471. Cross, W. E. **Informe anual del año 1919.** [**Annual report for 1919.**] Rev. Indust. y Agric. Tucuman 11: 1–24, 29–44. *19 fig.* 1920.—The activities and projects of the Tucuman agricultural experiment station include experiments with sugar cane, sugar beets, cotton, and a wide range of forage crops.—*John A. Stevenson.*

1472. Cross, W. E. **La necesidad de la rotación de cultivos para la caña de Java.** [**Necessity for crop rotations with the Javan cane varieties.**] Rev. Indust. y Agric. Tucuman 10: 115–124. *2 fig.* 1920.—The replacing of native (criollo) varieties of sugar cane with Javan seedlings necessitates changes in field practice of which crop rotation is the most important. The rotation recommended for Tucuman is 4 years in cane and 1 year in cowpeas, either alone or interplanted with maize; the cowpeas are plowed under. The plan recommended reduces the acreage in cane but gives a higher total yield.—*John A. Stevenson.*

1473. Cross, W. E. **Recientes resultados con algunos variedades de caña.** **[Recent results with cane varieties.]** Rev. Indust. y Agric. Tucuman 10: 74–79. 1919.—A report of 4 years' tests of the varieties S.N.179, S.N.211, L.60, and Collyn's seedling is given. All gave low yields as compared with the Javan seedlings and are not frost resistant, consequently are considered unsatisfactory for Tucuman. After 5 years' tests variety POJ105 is pronounced inferior to POJ36 and 213 in yield and frost and disease resistance. After 3 years' tests D1135 was found less frost resistant than the Javan varieties. Its contained sugar, however, does not invert so rapidly.—*John A. Stevenson.*

1474. Doblas, José Herrera. **Estudio sobre el maiz.** **[Maize studies.]** Bol. Asoc. Agric. España 12: 94–98. 1920.—This preliminary study of varieties of corn (maize) lists varieties by size of stalk and height of plant. Certain common varieties are compared as to size of grain, weight of ear, and other characters.—*John A. Stevenson.*

1475. Espinosa, Luis. **El mejoramiento de la caña de azucar en Rio Verde, San Luis Potosi.** **[Improving sugar cane.]** Rev. Agric. [Mexico] 5: 810–816. *9 fig.* 1921.—Brief descriptions and cultural directions are given of certain cane varieties, including Red Assam, Hambleden seedling, Hawaii 16 and 27, Lahaina, Morada, and Ribbon.—*John A. Stevenson.*

1476. Fawcett, G. L. **La obtención de cañas de semilla producida en la Argentina.** **[Production of sugar cane seedlings from Argentina seed.]** Rev. Indust. y Agric. Tucuman 10: 31–41. *12 fig.* 1919.—Until 1919 attempts by experiment station workers to obtain fertile seed for seedling production in Tucuman failed. This is thougbt to be due to weather conditions. The flowering panicles of the native cane variety (criolla), Kavangire, and certain of the Javan varieties are described.—*John A. Stevenson.*

1477. Fawcett, G. L. **Notas adicionales sobre las cañas criollas.** **[Further notes on native canes.]** Rev. Indust. y Agric. Tucuman 10: 169–175. *3 fig.* 1920.—Notes on the origin and distinguishing characters of native cane varieties in Tucuman are given. Pubescence, particularly of the buds, is considered. The prevalence of mutations in the varieties Rayada (striped), Morada (dark red), and Blanca (white), in comparison with the same or similar varieties in Java and elsewhere, is discussed. The author holds that the dark red cane has given rise to the striped and the striped to the white, but that the reverse has not occurred. Dr. Jeswiet of Java disagrees in part with this conclusion.—*John A. Stevenson.*

1478. Ferreira, Emilio I. **El algodonero.** **[The cotton plant.]** Bol. Ministerio Agric. Nación [Argentina] 25: 388–403. 1921.—This is a discussion of cotton culture and the varieties adapted to Argentina, seed selection, planting, cultivation, harvesting, and ginning.—*John A. Stevenson.*

1479. Gasser, G. W. **Report of the work at Rampert station.** Rept. Alaska Agric. Exp. Sta. 1918: 33–54. *Pl. 3–4.* 1920.—Among important facts recorded are: *Medicago falcata* is the only alfalfa perfectly hardy; *Vicia cracca* scored its first failure, after doing well in previous years; *Trifolium lupinaster* suffered winter injury for the first time since seeded in 1914; field peas were a failure on very dry ground, as only 1.6 inches of rain fell during May, June, and July,—lower-lying ground produced some peas; winter wheat and 1 variety of rye were failures, but 2 varieties of rye wintered almost perfectly. In the grain-breeding work all plats, except for a few increase plats of barley, oats, and wheat, were head to row, with 2 drill-row plats; earliest barley and oats ripened in 79 days from date of seeding, earliest wheat in 84 days. Hemp made a short spindling growth; flax ripened 10 per cent of seed when cut Sept. 7; some seed of Jersey Wakefield cabbage was produced, but carrot seed failed to ripen; potatoes grown in pens or cribs produced only ½ as much as in the garden, where 2–2.8 pounds per hill were produced; peas, celery, beans, cabbage, cauliflower, brussels sprouts, kohl-rabi, chard, beets, sugar beets, and carrots were grown successfully in the garden, while cucumbers, muskmelons, egg plant, and peppers were grown in hotbeds; tomatoes were grown in the greenhouse, and a few ripened outside; strawberries winter-killed to some extent; flowers and house plants were successfully grown.—*J. P. Anderson.*

1480. Gasser, G. W. **Report of work at Rampert station.** Rept. Alaska Agric. Exp. Sta. 1919: 30–44. *Pl. 3–6*. 1920.—The author reports on trials and breeding of wheat, barley, oats, and rye. *Medicago falcata, Vicia cracca*, field peas, and various garden vegetables and potatoes were also grown. Most greenhouse plants fail to survive the winter as the sun disappears entirely from late November to late January.—*J. P. Anderson.*

1481. Girola, Carlos D. **El cultivo del ricino en Argentina. [Cultivation of the castor bean.]** Bol. Ministerio Agric. Nación [Argentina] 25: 469–498. *2 fig.* 1920.—The culture of castor bean is well adapted to certain portions of Argentina lying between the 32nd and 40th parallels. The species or type known as *Ricinus sanguineus* is recommended for this region. Higher yields are obtained from annual plantings than where the plant is treated as a perennial. Cultural directions from planting to harvesting are given, and methods of oil extraction are considered.—*John A. Stevenson.*

1482. Girola, Carlos D. **Planta invasora-perjudicial y toxica. [An injurious and poisonous plant immigrant.]** Bol. Ministerio Agric. Nación [Argentina] 25: *1 colored pl. (facing p. 468)*. 1920.—This author describes *Datura stramonium*, the damage it causes, and methods of control.—*John A. Stevenson.*

1483. Girola, Carlos D. **Planta invasora-perjudicial. [An injurious plant immigrant.]** Bol. Ministerio Agric. Nación [Argentina] 25: *1 colored pl. (facing p. 380)*. 1921.—The author describes *Cirsium lanceolatum*, damage caused by it, and methods of control.—*John A. Stevenson.*

1484. Girola, Carlos D. **Sobre una leguminosa forrajera indígena. [A native leguminous forage plant.]** Bol. Ministerio Agric. Nación. [Argentina] 25: 375–387. *1 fig.* 1920.—*Meibomia leiocarpa*, said to be indigenous in Argentina and Brazil, has proved satisfactory as a forage crop in tropical and subtropical Argentina. It is valuable as green feed and for silage. The plant is described and cultural directions are given. The feed value of the plant is shown by analyses made in Argentina, Brazil, and Cuba.—*John A. Stevenson.*

1485. Girón, Enrique Giménez. **Estudio sobre germinación de semilla duras. [Germination of hard seeds.]** Bol. Agric. Téc. y Econ. [España] 13: 596–608. *3 fig.* 1921.—The author discusses mechanical and chemical means of increasing the germination percentage of hard-coated seeds.—*John A. Stevenson.*

1486. Granel Joaquin. **La avena. [Oats.]** Bol. Soc. Rural Cordoba [Argentina] 20: 5271–5282. 1920.—This history of the cultivation of oats in Argentina includes cultural directions as to soils, fertilizers, seeding, varieties, rotations, and harvesting.—*John A. Stevenson.*

1487. Hall, Thos. D. **Moisture in maize.** Jour. Dept. Agric. Union of South Africa 3: 80–81. 1921.—Maize harvested and stored in this climate is not ready to ship to the coast before the end of July or beginning of August. A table is given showing the percentage of moisture in stored maize at different dates.—*E. M. Doidge.*

1488. Hartwell, Burt L. **Thirty-second annual report of the director of the Rhode Island Agricultural Experiment Station.** Bull. Rhode Island State Coll. 15: 69–84. 1920.—The report gives brief statements of the results of the experiments of 1919, grouped in part under the following headings: Organic matter for the soil; efficiency of fertilizers and other manures; plant differences and needs; effect of crops on each other; changing sour soils; plant propagation; inheritance studies with poultry and rabbits; studies of immunity and infection. —*B. L. Hartwell.*

1489. Kuhnert. **Der Sonderausschuss für Flachsbau der D. L. G. und seine Tätigkeit. [The commission for flax culture of the Deutsche Landwirtschaftliche Gesellschaft and its work.]** Mitteil. Deutsch. Landw. Ges. 36: 417–420. 1921.—The author briefly reviews the

origin of the commission and reports on fertilizer tests. Stable manure was injurious, potash and phosphoric acid increased both quantity and quality of output, and nitrogenous fertilizers were helpful if used sparingly and with extreme care. Microscopical studies of the length, diameter, and tensile strength of fibers were also made.—*A. J. Pieters.*

1490. Melle, H. A. **Spineless cactus as a fodder for stock.** Jour. Dept. Agric. Union of South Africa 3: 68–79. *5 fig.* 1921.—Spineless cactus is easily and cheaply grown and is an excellent means of preventing soil erosion. It is a natural silage and may be harvested at any season of the year. Although not a balanced ration it can be fed in large quantities with other foods, especially during the winter months.—*E. M. Doidge.*

1491. Navarro, Bernabé G. **La industria de los textiles vegetales en las territorios nacionales del norte del pais. [The textile industry in the northern territories of Argentina.]** Bol. Ministerio Agric. Nación [Argentina] 25: 499–522. 1921.—The author discusses the textile needs of the country and the prospects of obtaining home-grown supplies. Details of the long staple cotton growing industry in the U. S. A. and of the sisal industry of Yucatan are given, and certain indigenous fiber-yielding plants are described.—*John A. Stevenson.*

1492. Noll, C. F., and R. D. Lewis. **Soy beans.** Pennsylvania Agric. Exp. Sta. Bull. 167. *20 p., 1 fig.* 1921.—Soy bean varieties leading in yield of seed in these tests were Ebony, Elton, Manchuria, Merko, Mongol, and Ohio 10,015. Those leading in yield of hay are Ohio 7,496, Ohio 10,015, Elton, Ohio 9,035, Ohio 9,016, and Merko. In an 8-year comparison of soy beans and oats, each in a 4 year rotation, soy beans produced much more protein per acre. When cut for hay soy beans also produced slightly more net energy. Wheat gave somewhat lower yields after soy beans than after oats, because of late seeding after soy beans. Soy beans when grown with corn for silage failed to show an increase in total yield over corn grown alone. If soy beans comprise 10 per cent or more of the crop when grown with corn, an appreciable increase in per cent of protein is noted in the silage.—*C. R. Orton.*

1493. Parish, E. **Chicory as a farm crop.** Jour. Dept. Agric. Union of South Africa 3: 12–130. 1921.—This is a general account of cultural methods for chicory and is supplemented by notes by K. Meldal Johnsen, on the cultivation of the crop in the Alexandria District of the Cape Province.—*E. M. Doidge.*

1494. Pratt, H. E. **Report of work at the Kodiak live stock and breeding station.** Rept. Alaska Agric. Exp. Sta. 1918: 84–90. *Pl. 10.* 1920.—Oats and field peas were grown for hay. Ten acres of Banner oats were grown; also 3 varieties of barley. Red clover and alfalfa were winter killed. A variety of vetch made poor growth compared with field peas. Attempts to introduce tussock-grass (*Poa flabellata*) from the Falkland Islands were not successful. Twelve varieties of potatoes were tested. Silage is made chiefly from beach rye (*Elymus mollis*) and beach sedge (*Carex cryptocarpa*). Sunflowers grown for silage were not profitable. Native bluetop (*Calamagrostis langsdorfii*) is the principal grass used for hay.—*J. P. Anderson.*

1495. Puig, Juan. **El cultivo del Phalaris bulbosa en el Uruguay. [Cultivation of Phalaris bulbosa in Uruguay.]** Inspección Nacion. Ganaderia y Agric. [Uruguay] Bol. 40. *32 p., 6 fig.* 1921.—Either seed or cuttings may be used to establish *Phalaris bulbosa*, which has proved an excellent forage crop. It is very resistant to cold, grows on practically all soils, and yields as a rule 4 cuttings each season. The author outlines cultural directions, and tabulates yields obtained in experimental work.—*John A. Stevenson.*

1496. Puig, Juan. **El sorgo azucarado. [Sweet sorghum.]** Inspección Nacion. Ganaderia y Agric. [Uruguay] Bol. 39. *42 p., 19 fig.* 1920.—Sorghum has proved very satisfactory as a forage crop under the dry conditions prevailing in many parts of Uruguay. Cultural directions are given, including methods of harvesting, and preparation of silage. Variety tests were conducted with milo, amber sorghum, pink Kaffir, Sudan grass, and other sorghum varieties, the variety commonly grown being Early Minnesota; yields obtained are tabulated. A method of making chemical tests for presence of hydrocyanic acid in the forage from the

varieties is described; a color chart illustrating these tests is included. The feeding value of the sorghums in relation to alfalfa and other forage crops is discussed, and the chemical analyses of the grain and hay obtained from the various varieties are given.—*John A. Stevenson.*

1497. Quin, Herbert G. **The peanut (Arachis hypogea).** Jour. Dept. Agric. Union of South Africa 3: 160–164. *3 fig.* 1921.—This is a general account of the peanut plant and methods to be used in its cultivation.—*E. M. Doidge.*

1498. Rader, F. E. **Report of work at Matanuska station.** Rept. Alaska Agric. Exp. Sta. **1918**: 71–84. *pl. 7–9.* 1920.—The grains for seeding were grown at the Fairbanks station in 1917. Three varieties of wheat, 2 of oats, and 2 of barley were tried. Spelt grew well but lodged badly and did not ripen; buckwheat was successful. Oats were grown for hay. Several varieties of winter rye made good growth. Canada field peas sown May 18 had ripened half the pods by Oct. 1. Corn was not a success. Sugar beets were small, containing 14.6–16.9 per cent sugar. Mangel-wurzel, beets, and carrots grown for stock feed gave disappointing results; rutabagas and turnips, however, did well. Forty varieties of potatoes and 10 of the best early seedlings from the Sitka station were tried. Potatoes are the chief money crop of the region. Cauliflower does well. A nursery is being started.—*J. P. Anderson.*

1499. Renson, Carlos. **El barajillo, leguminosa forrajera de America Central. [A leguminous forage plant for Central America.]** Rev. Agric. Tropic. [Salvador] 1: 65–93. *8 pl.* 1921.—*Meibomia rensoni* Paynter in ed. (locally known as barajillo), a native shrub of Salvador growing at altitudes 600–1200 m. above sea level, gives promise as a forage plant. Difficulties were experienced in obtaining a stand, because sections of the pods were used for planting rather than the cleaned seed. Directions for obtaining cleaned seed and for seeding are given. —*John A. Stevenson.*

1500. Renson, Carlos. **El zacate jaraguá. [Jaragua grass.]** Rev. Agric. Trop. [Salvador] 1: 2–9. *4 pl.* 1921.—*Cymbopogon rufus* is a forage grass of Brazilian origin which has given excellent results. Directions for obtaining a stand by various methods of seeding are given.—*John A. Stevenson.*

1501. Richthofen, von. **Rauhweizen (Rivett's sheriff bearded). [Bearded wheat (Rivett's sheriff bearded).]** Mitteil. Deutsch. Landw. Ges. 36: 541. 1921.—Though bearded wheat is seldom grown at present, Rivett's Sheriff Bearded is distinctly advantageous for seeding after oats, as it produces better yields and matures 10 days later than other varieties. The author believes that seeding after clover is a mistake.—*A. J. Pieters.*

1502. Rindl, M. **Castor beans and castor oil.** South African Jour. Indust. 4: 540–547. 1921.—Although climatic and other conditions in Natal and Portuguese East Africa are suited for growing the castor oil plant, the only prospect of commercial success lies in the possibility of the world's demand for lubricants exceeding the supply of mineral-oil lubricants. —*E. M. Doidge.*

1503. Rindl, M. **Some sources of semi-drying oils.** South African Jour. Indust. 4: 479–485. 1921.—The possibilities of a number of plants as oil-producers, are considered. Corn oil and cotton seed oil as produced in South Africa are discussed. Manketti nuts (*Ricinodendron rautanenii* Sching) yield a semi-drying oil insoluble in alcohol and readily soluble in light petroleum. But as long as other oil seeds are obtainable at reasonable rates, intractable nuts of this kind with low oil content are likely to remain unused; this is true also of Ingogo nuts. Seeds of *Jatropha curcas*, cultivated in the Portuguese colonies, are exported to Portugal in considerable quantities for making Curcas oil, a strong purgative.—*E. M. Doidge.*

1504. Rodríguez, Socrates. **Nociones sobre ensilaje de plantas. La parva-silo. [Notes on silage making. The stack silo.]** Inspección Nacion. Ganaderia y Agric. [Uruguay] Bol. 35. *22 p., 10 fig.* 1919.—Methods of making stack silos and the importance of silage in Argentina

and Uruguay are discussed. Directions are given for planting and harvesting, and making silage, of sorghum and corn.—*John A. Stevenson.*

1505. RUBY, M. J. **Essais de sorgho et maïs à sucre en vue de la production de l'alcool industriel. [Experiments with sorghum and sweet corn for production of industrial alcohol.]** Ann. Sci. Agron. Française et Etrangère 37: 155–161. 1920.—Maize and sorghum were successfully grown for sugar in the fertile and irrigable lands of the plain of Roussillon (Eastern Pyrenees). On the basis of field experiments with 4 varieties of sorghum and 5 of maize, sorghum is considered preferable because it makes greater vegetative growth, is richer in sugar, and is not injured by the European corn borer (*Pyrausta nubilalis*), which considerably reduced the yield of maize.—*A. B. Beaumont.*

1506. SCASSO, JOSÉ M. **Instrucciones practicas para preparar la parva-silo o silo al aire libre y el silo comun en tierra. [Instructions for making pit and stack silos.]** Bol. Ministerio Agric. Nacion [Argentina] 26: 60–87. *19 fig.* 1921.—The author gives directions for making various types of pit and stack silos adapted to conditions in Argentina.—*John A. Stevenson.*

1507. SCHUBERT. **Die Feststellung der Ertragssteigerung auf Dauerweiden. [Determining increased yields on permanent pastures.]** Mitteil. Deutsch. Landw. Ges. 36: 338–339. 1921.—The author points out the difficulties in determining returns from treating pastures and proposes using 1 herd only, shifting it from one field to another. Two experiments on fertilizing pastures showed that applying nitrogen caused increased live weight and milk yields which far exceeded the cost of the fertilizer.—*A. J. Pieters.*

1508. SCHULTZ, E. F. **El problema de los pastos en Tucuman. [The problem of forage crops for Tucuman.]** Rev. Indust. y Agric. Tucuman 10: 59–74. *9 fig.* 1919.—The Tucuman experiment station has tested many plants to secure forage crops resistant to the adverse weather conditions, as scarcity of pasturage and forage during the dry seasons causes heavy losses to cattle raisers. Peruvian alfalfa is much superior to the native type, giving 5 cuttings as against about 3 for the latter. It is very resistant to cold, but is injured by excessive rain. *Phalaris bulbosa* resists cold but is difficult to establish by seeding. Increase by division of old plants has proved more satisfactory. *Paspalum dilatatum* was abandoned because of the presence of a fungus (*Claviceps*) in the spikelets which is reported as killing the stock. Rhodes grass is considered the best of all forage crops that can be grown without irrigation. Sudan grass is very resistant to drouth, a rapid grower and high yielder. Natal grass was not satisfactory. Cow peas can be used in rotations with other crops and are well adapted to all parts of the country. Sweet sorghums, rape, timothy, *Dactylis glomerata*, *Lolium* spp., *Festuca* sp., and *Poa pratensis* are suited to certain parts of the province.—*John A. Stevenson.*

1509. SCHULTZ, E. F. **La batata forrajera "Dahomey." [The Dahomey sweet potato as a forage crop.]** Rev. Indust. y Agric. Tucuman 10: 100–108. *5 fig.* 1919.—Until the variety Dahomey, secured from U. S. A. Department of Agriculture, was grown in Tucuman, sweet potatoes had been grown mainly for human food. The Dahomey is recommended for animal feeding because of its large yields, and is in addition superior to the native variety for human consumption. The presence of *Rhizoctonia violacea* constitutes a drawback to its culture. Cultural directions are given.—*John A. Stevenson.*

1510. SCHULTZ, E. F. **Notas adicionales sobre la grama Rhodes. [Additional notes on Rhodes grass.]** Rev. Indust. y Agric. Tucuman 11: 45–54. *7 fig.* 1920.—Rhodes grass has survived temperatures of from −7 to −10°C. and is also very resistant to heat and drouth. The 1st cutting, obtained 49 days after seeding, averaged 25,000 kgr. of green feed per hectare, the 2nd 13,000. Stock pastured on the grass gained weight satisfactorily and without injuring the stand. The grass is easily eradicated. Seeding should be done preferably in October or November.—*John A. Stevenson.*

1511. SCHULZ, A. **Getreidestudien I. Abstammung und Heimat des Roggens. [Place of origin and descent of cultivated rye.]** Ber. Deutsch. Bot. Ges. 37: 528–530. 1919.—The

author concludes from his examination of the evidence that cultivated rye (*Secale cereale* L.) originated from *Secale anatolicum* Boissier and came into cultivation in Turkestan.—*R. M. Holman.*

1512. Semichon, L. **Analyses des sorghos et maïs sucrés cultivés à Palau-del-Vidre (Pyrénées-orientales). [Analyses of sorghums and sweet corns cultivated in Palau-del-Vidre (Eastern Pyrenees).]** Ann. Sci. Agron. Française et Étrangère 37: 173–184. 1920.—Analyses of the 5 varieties of sorghum and 4 varieties of maize grown experimentally [see Bot. Absts 10, Entry 1505] are reported. The sorghum yielded per hectare as much as 6200 kgr. sugar, corresponding to 3750 l. of alcohol, a good quality being obtained without rectification. The pressed pulp may be used as cattle food, and also has possibilities for paper making. Sweet corns are less promising than sorghums because of smaller yield, smaller sugar content, and more difficult preservation, both in the field and after harvest.—*A. B. Beaumont.*

1513. Sherwin, M. E. **Effect of fertilizers on germination and seedling growth of corn and cotton.** Jour. Elisha Mitchell Sci. Soc. 36: 16. 1920.—Heavy applications of soluble mineral fertilizers cause greater delay in germination. Organic fertilizers cause greater injury to the seedlings. Very small amounts of borax cause almost complete chlorosis of corn seedlings.—*W. C. Coker.*

1514. Silveira, Ricardo Salgueiro. **Plantas oleaginosas. [Oil plants.]** Inspección Nacion. Ganaderia y Agric. [Uruguay] Bol. 37. *21 p.* 1920.—The following oil producing plants can be successfully grown in Uruguay: peanut, sunflower, cotton, rape, soy bean, castor bean, and *Sesamum orientale.* Brief cultural directions are given for each, including recommended varieties, seeding, cultivation, and harvesting.—*John A. Stevenson.*

1515. Snodgrass, M. D. **Report of the work at Fairbanks station.** Rept. Alaska Agric. Exp. Sta. 1918: 54–71. *Pl. 5–6.* 1920.—Rye winter killed badly. Spring grains were seeded May 26–30, the late spring following an unusually cold winter. Grain following grain matured earlier but produced less than grain following other cultivated crops; the yield was better following clover but endangered by lodging or early frosts. Comparisons of grain selections are given for breeding plats as well as for increase plats. Of new varieties, 1 of barley and 4 of wheat were received from the U. S. A. and Canada, and 4 of barley from Rampert. Some work was done in alfalfa selection. Twenty-three varieties of potatoes were tested. Potatoes on south slopes were better than those on north slopes; potatoes with the tops cut off when frosted August 26 yielded less than when the tops were left on until digging time. Turnips, carrots, and sugar beets comprised the root crops grown. Strawberries were a failure owing to winter injury. Red raspberries are being tried.—*J. P. Anderson.*

1516. Snodgrass, M. D. **Report of work at Fairbanks Station.** Rept. Alaska Agric. Exp. Sta. 1919: 44–55. *Pl. 7–13.* 1920.—Yields of wheat and Canadian oats are reported and a table on variety tests of barley and oats is given. Potatoes, sugar beets, carrots, turnips field peas, sunflowers, and red clover were grown. Hansen's Semipalatinsk alfalfa has withstood 4 winters, but other kinds have not proved so hardy.—*J. P. Anderson.*

1517. Stent, Sydney M., and H. A. Melle. **Fodder and pasture grasses of South Africa. II. Rhodes grass (Chloris gayana Kuth).** Jour. Dept. Agric. Union of South Africa 3: 136–141. *2 fig.* 1921.—Rhodes grass, a native of South Africa, was first brought into cultivation by Cecil Rhodes. It is a perennial, mainly a summer grass, requiring a summer rainfall, and will not withstand protracted drought or very severe cold. It is an excellent pasture and hay grass and palatable to all kinds of stock, thus comparing favorably with Teff and Kikuyu.—*E. M. Doidge.*

1518. Taylor, H. W. ***The culture of Virginian tobacco.*** *South African Jour. Indust.* 4: 650–662. *Pl. 1–5.* 1921.—In Rhodesia the rainfall is ample for the cultivation of Virginia tobacco and this is generally true in the Magaliesberg, Kat River, and Oudtshoorn areas. Several types of soils are considered suitable; black turf gives good results but is inclined to

be alkaline; sandy loams may be used, if judiciously fertilized. The preparation of soil and methods of cultivation of Virginia tobacco are discussed in detail.—*E. M. Doidge.*

1519. Taylor, H. W. **The tobacco industry.** South African Jour. Indust. **4**: 467–472, 563–574. *Pl. 1–3.* 1921.—The total amount of commercial tobacco produced in Africa is probably not above 70,000,000 pounds, of which the Union of South Africa produced 14,931,000 in 1918. Tobacco is grown in the Transvaal chiefly in the Magaliesberg area, in the Piet Retief and Potchefstroom districts, and in the western part of the Cape Province. The qualities of the various types, mainly Turkish, cigar, and Virginia, grown in different districts are discussed, and directions given for selection of seed and proper preparation of seed beds.—*E. M. Doidge.*

1520. Tice, C. **The potato industry in British Columbia.** Potato Mag. **4**[4]: 8, 20–21 *1 fig.* 1921.—Favorable climate and soil and freedom from certain pests and diseases make potatoes yield well in British Columbia. Improvement is expected from seed certification, rules of which are given.—*Donald Folsom.*

1521. Tonnelier, A. C. **Informe sobre diversos métodos del cultivo del maiz. [Methods of maize cultivation.]** Bol. Ministerio Agric. Nación [Argentina] **25**: 47–54. *1 fig.* 1920. This reports experiments to ascertain the best methods of cultivating maize, carried out over a period of 8 years, 1909–1917. No difference in yields was noted between plots hilled and those not hilled. Opening ditches or furrows between rows and gradually filling them gave increased yields, while the system of ditches kept open between rows proved most satisfactory of all.—*John A. Stevenson.*

1522. Torres, L. G. **Una leguminosa forrajera indigena. [An indigenous leguminous forage plant.]** Rev. Agric. [Mexico] **6**: 84–86. *2 fig.* 1921.—*Meibomia leiocarpa*, a native of Brazil and parts of Mexico, has given promise as a forage plant in Cuba and is recommended for trial in Mexico. Brief cultural directions are given.—*John A. Stevenson.*

1523. Vasquez, David. **El trigo. [Wheat.]** Rev. Soc. Rural Cordoba [Argentina] **20**: 5090–5109. 1920.—Seed selection, hybridizing, and seed disinfection of wheat are discussed.—*John A. Stevenson.*

1524. Wagner, Paul. **Die Düngung der Wiesen. [The fertilizing of meadows.]** Arbeit. Deutsch. Landw. Ges. 308. *141 p.* 1921.—This report on 15 series of experiments in fertilizing meadows, carried on for periods of from 4–14 years, gives tables showing percentages of phosphoric acid, potash, and nitrogen in hay at 15 per cent moisture content, and total yield of hay. The fertilizers used were forms of potash, phosphoric acid, and nitrogen in varying combinations. Forty questions, covering all phases of the effects of various fertilizers, are asked, and answered by the results of 1 or more series of experiments. In general both phosphoric acid and potash increase yields, but neither alone gives maximum results. The application of one on soil deficient in the other is ineffective. Composition of hay may be taken as an index to the fertilizer needs of the soil. Application of nitrates results in small and unprofitable increases, the total nitrate content of the hay being no more and sometimes less than that of hay produced on plots receiving potassium and phosphorus. This is explained by the fact that nitrates however used encourage the grasses but suppress the legumes.—*A. J. Pieters.*

1525. Weiss, H. B. **Field crop yields in New Jersey from 1870–1919.** Sci. Monthly **13**: 342–349. 1921.—Curves from 10-year reports of the last 50 years show a gradual increase in the acreage of field crops in New Jersey. This is attributed to the intelligent use of fertilizers, general efficiency, improved methods of soil management, seed selection, and increased control of insects and plant diseases.—*L. Pace.*

1526. White, W. T. **Report of work at Kodiak station.** Rept. Alaska Agric. Exp. Sta. **1919**: 55–65. *Pl. 14.* 1920.—At Kalsin Bay the application of 10 tons of stable manure per

acre increased the yield of hay 11 per cent, and adding 125 pounds of sodium nitrate to the manure increased the yield 15 per cent. Test of sunflowers for silage was not promising. Alfalfa, spurry, Petrowski turnips, buckwheat, and vetch were also tested as forage crops. Potatoes and some vegetables were grown, and gooseberry and currant responded well to cultivation.—*J. P. Anderson.*

BIBLIOGRAPHY, BIOGRAPHY AND HISTORY

Neil E. Stevens, *Editor*

(See also in this issue Entries 1511, 1517, 1624, 1631, 1652, 1670, 1783, 1908, 1909, 1920, 2014)

1527. Anonymous. [**Commemoration of the 250th anniversary of the birth of Herman Boerhaave (Dec. 31, 1668–Sept. 23, 1738).**] Janus 23: 193–369. *9 pl., 19 fig.* 1918.—The following papers, chiefly in German and French, make up the memorial: Discourse on the life of Boerhaave, by E. C. van Leersum (p. 193–206); (2) Boerhaave as oculist, by W. P. C. Zeeman (p. 207–214); (3) his influence on the development of medicine in Austria, by Max Neuburger (p. 215–222); (4) his importance for the science of chemistry, by Ernst Cohen (p. 223–290); (5) Boerhaave as professor-promoter, by J. E. Kroon (p. 291–315); (6) his clinical teaching as shown in Gerard van Swieten's stenographic records, by E. C. van Leersum (p. 316–346 and 8 fac-simile plates); (7) Boerhaave as a naturalist, by F. W. T. Hunger (p. 347–357); (8) engraved portraits of Boerhaave, by J. G. de Lint (p. 358–365); (9) his portrait by by Arent de Gelder, by W. Martin (p. 366–369). The last mentioned serves as frontispiece, while many of the portraits discussed by de Lint, together with those of contemporaries, and illustrations of places and objects of interest, are found in pages 223–290. The articles by Cohen, Hunger, and Neuburger are of special importance for the history of science, and many of the papers are richly documented.—*M. F. Warner.*

1528. Anonymous. **David Ernest Hutchins.** Kew Bull. 1921: 32–33. 1921.—Sir David Ernest Hutchins (1850–1921) was trained at the École Nationale des Eaux et Forêts, Nancy, and entered the forest service of Mysore, but in 1882 was transferred to Cape Colony, where he remained until 1905. He wrote several important reports on the forests of Mt. Kenia, Cyprus, Australia, and New Zealand.—*M. F. Warner.*

1529. Anonymous. **Mulford biological exploration.** Amer. Jour. Pharm. 93: 438–443. 1921.—A brief outline is presented of the plans of the Mulford biological exploration of the Amazon Basin under the direction of H. H. Rusby. [See also Bot. Absts. 8, Entry 2133.]—*Anton Hogstad, Jr.*

1530. Anonymous. **Presentation of medal to F. B. Power.** Amer. Jour. Pharm. 93: 435–438. *Pl. 1–2.* 1921.—An account is given of the presentation of a gold medal by Henry S. Wellcome to Dr. Frederick B. Power, in recognition of his services as Director of the Wellcome Research Laboratories for a period of nearly 20 years prior to 1914.—*Anton Hogstad, Jr.*

1531. Anonymous. **Suspension of "The Botanical Magazine."** Gard. Chron. 69: 133–134. 1921.—Believing that a work so long identified with Kew Gardens ought to become an official publication, the publishers offered to the government the good will and copyright purchased from the Curtis family in 1844, but as the Ministry of Agriculture was unable to take advantage of this offer, the journal is discontinued from Dec. 1920.—*M. F. Warner.*

1532. Anonymous. **The early records of sugar cane. Approximate geographical table.** South African Sugar Jour. 5: 183. 1921.—"It seems definitely established that sugar cane was growing on the Ganges in 327 B. C. and in China in 250 B. C.," but other early dates are vague. It is next positively mentioned in A. D. 627, when the Byzantine emperor Heraklius destroyed Dastagerd, in Persia. A chronological table is given showing the spread of sugar cane to different parts of the world from A. D. 680 to 1852.—*M. F. Warner.*

1533. ANDREWS, A. LEROY. **John Macoun.** Bryologist 24: 39–41. 1921.—John Macoun (1830–1920), born near Belfast, Ireland, came to Ontario in 1850. He taught school, became professor at Albert College, Belleville, and in 1881 Botanist to the Dominion Government. The rest of his life was spent in government service, doing that pioneer work in the botanical exploration of Canada with which his name will always be associated. He was also much interested in zoology, especially ornithology. Macoun's hepatics and sphagna were determined by competent European students; his mosses by Müller and Kindberg, who "developed an irresponsibility as to species from which bryology still suffers."—*E. B. Chamberlain.*

1534. ARBER, AGNES. **The draughtsman of the 'Herbarum Vivae Eicones.'** Jour. Botany 59: 131–132. 1921.—The author presents further evidence to prove that Hans Weiditz was the artist and engraver of the illustrations in the Herbarum Vivae Eicones of Otto Brunfels.—*Adele Lewis Grant.*

1535. ARNELL, H. W. **Nécrologie. [Scandinavian bryologists that have died in recent years.]** Rev. Bryologique 47: 74–75. 1920.—The author reports the deaths of the following Scandinavian botanists and lists their more important bryological publications: Nils Bryhn, who was a physician at Hönefos, Norway, and died in December, 1916, at the age of 62; Ingebrigt Severin Hagen, a physician at Trondhjem, Norway, who died in June, 1917, at the age of 63; Sven Berggren, a professor at the University of Lund, Sweden, who died in June, 1917, at the age of 80; and Baard Kaalaas, a school inspector at Kristiania, Norway, who died in September, 1918, at the age of 67.—*A. W. Evans.*

1536. BLOSSFELD, ROBERT. **Sander ist tot! [Death of Sander.]** Gartenwelt 25: 80. *Portrait.* 1921.—An account is given of the life and work of Heinrich Friedrich Konrad (i.e., Frederick) Sander, born in Bremen in 1847, died in Bruges, Dec. 23, 1920. He founded the firm of Sander & Sons, of St. Albans, England, and Bruges, noted importers and growers of orchids.—*M. F. Warner.*

1537. BONAPARTE, ROLAND. **Usages et folk-lore des fougères. [Customs and lore of ferns.]** La Nature 47^2: 401–403. *Fig. 1–3.* 1919.—Among ancient remedies was the "Scythian lamb" (*Cibotium Barometz*), found in India, Java, Cochinchina, and China, the silky down of which is reported by Père Cadière as still used in northern Annam for dressing cuts, a practice discussed by Loureiro in his Flora Cochinchinensis. The Annamites also use *Adiantum flabellatum* for wounds made by sharp instruments. They eat the young shoots of *Diplazium esculentum* and the rhizomes of *Polypodium coronans; Cleichenia linearis,* which is very tough, furnishes rough partitions in stables, and the dry fronds of *Acrostichum aureum* are used to thatch their houses. *Platycerium coronarium* is regarded by the Annamites with awe or fear; they believe that it harbors a spirit and will not cut down trees on which it grows. —*M. F. Warner.*

1538. BRITTEN, JAMES. **Alexander Irvine.** Jour. Botany 59: 178–179. 1921.—An interleaved copy of Irvine's London Flora (1838), part of the additions to which were later utilized in his Illustrated Handbook of British Plants, furnishes the motive for several interesting items and references to biographical accounts of this botanist. Irvine was editor of The Phytologist in the '50's, and the Botanists' Chronicle (1863–65).—*M. F. Warner.*

1539. [BRITTEN, JAMES.] **Clara Maria Pope.** Jour. Botany 56: 126–127. 1918.—The 3rd wife of Alexander Pope was noted for her paintings of flowers, of which several groups, made about 1820–22, are mentioned.—*Neil E. Stevens.*

1540. BRITTEN, JAMES. **Gentiana pneumonanthe.** Garden 85: 19–20. 1921.—There are no problems of nomenclature connected with this plant, although it has had a long history in botanical literature. Its specific name was first used by Cordus (1561), who called the plant Pneumonanthes. The English "Calathian Violet" used by Gerard, and first given by Lyte in his translation of Dodoens (1578), is merely the translation of Viola Calathiana of Pliny, who may not have meant this plant. Ruellius (1536) definitely applied to it the name

Calathiana. The earliest figure, as well as the first English description, is that of Lyte (1578), and Britten cites many other pre-Linnean illustrations and a number of early records of British localities.—*M. F. Warner.*

1541. Britten, James. **"John Frederick Miller and his Icones."** (**Bibliographical notes, LXXVIII.**) Jour. Botany 57: 353. 1919.—This refers to a note (LIII) published in 1913, describing a fascicle of 7 plates bound with the Icones Animalium et Plantarum of John Frederick Miller, but which are actually by his father, John Miller.—*Neil E. Stevens.*

1542. [Britten, James.] **Robert Allen Rolfe.** Jour. Botany 59: 182–183. 1921.—The botanical work of Rolfe, who died April 13, 1921, is summarized. He had been at Kew since 1879, devoting himself to the Orchidaceae, but "much good work in other orders stands to his credit." The name *Rolfea* was given by Zahlbrückner in his honor to a Guiana orchid which had been named by Rolfe *Jenmania*, in ignorance of the fact that this generic name was preempted.—*M. F. Warner.*

1543. Britten, James. **The Compendium of Smith's 'English Flora.'** (**Bibliographical notes. LXXXIV.**) Jour. Botany 59: 176–178. 1921.—Under this head Britten discusses the several editions of this book, and the crediting of the 1st (1829) to Aeneas MacIntyre, with mention of other work by him.—*M. F. Warner.*

1544. Britten, James. **The true Shamrock and how to identify it.** Garden 85: 139–140. 1921.—Facts and traditions are presented regarding the Shamrock, with quotations from early botanical writings showing that the name was originally applied to both purple and white clovers (*Trifolium pratense* and *T. repens*), and later generally restricted to the white. For a long time, however, it has been applied strictly to *T. minus*, the lesser yellow trefoil.—*M. F. Warner.*

1545. Brockmann-Jerosch, H. **Surampfele und Surchrut. Ein Rest aus der Sammel stelle der Ureinwohner der Schweizeralpen.** [*Sorrels; a survival of the food resources of the* **primitive inhabitants of the Swiss Alps.**] Neujahrsbl. Naturf. Ges. Zürich 123: 1–28. 1921.—The knowledge of wild plants still used as food throws light on primitive foodstuffs, and an example is found in Swiss species of *Rumex*, which are indigenous in the Alps, are widely distributed, and in their popular names give evidence of wide and long-continued use. The tender sour forms of the section *Acetosella* are gathered and eaten by children and also sold in the markets. They are sometimes cultivated and crossed with the less acid, large-leaved species of the section *Lapathum*, producing a plant of more luxuriant growth, a process of improvement which has long been practised. *Rumex alpinus*, the "Blacken" or "Blackten," which grows everywhere in Switzerland, has popular names indicating a varied utilization. Its young leaves are eaten like spinach, while its fresh stalks are eaten raw as a tidbit by both children and adults. It is a substitute for the costly Asiatic rhubarb of the pharmacopoea, and its leaves are used externally as cooling applications. But its largest use at the present time is as fodder for pigs, the leaves being gathered in season and either dried or cooked and stored for winter consumption in the form known as "Mass." "Blackten" is rather extensively grown in gardens, often very crudely cultivated, but sometimes well manured and tended. Thus the use of *Rumex alpinus* in Switzerland today corresponds to all stages of human culture, exhibiting: (1) Plants growing wild, unused; (2) plants gathered for use; (3) wild plants tended with reference to competition and perpetuation; (4) actual cultivated plants. Researches in literature and tradition show, moreover, that "Blackten" was a primitive economic plant, and that "Mass" was originally a human food.—*M. F. Warner.*

1546. Bunyard, E. A. **Cherry culture in Kent.** Garden 85: 256–257. 1921.—The article concerns the culture of cherries, which is said to have been "revived" by Richard Harris, gardener to Henry VIII. The story of Harris is given in The Husbandman's Fruitful Orchard (1609), and the passage quoted, showing that he brought "out of Fraunce great store of graftes, especially Pippins, before which time there were no Pippins in England," also cher-

ries and pears from the Low Countries, does not indicate that cherry culture had languished before that time. Numerous references are given to show that, on the contrary, cherries must have been largely grown in mediaeval times and ever since.—*M. F. Warner*

1547. C., J. **The size of yew trees.** Garden 85: 205–206. 1921.—Mention is made of an article in Glasgow Naturalist, Vol. V., No. 1, by John Renwick, entitled "Yew trees in the Clyde area," which gives measurement of the yew at Loudoun Castle, Ayrshire, taken 1911. At 2 feet from the ground it measured 13 feet, 9½ inches and had a spread of 81 feet. Four centuries may be given as a very probable age for this yew, under whose branches it is said that the articles of union between Scotland and England were signed. Other measurements and statements from Renwick's article are quoted.—*M. F. Warner.*

1548. Durham, H. E. **Some etymological notes.** Jour. Pomol. 2: 115–129. 1921.—Numerous derivations have been suggested for the name Permain or Pearmain, but the use of the word in very old literature in connection with the Warden pear indicates that it was applied to a fruit of great keeping quality, hence it was probably from the old French permaindre or parmaindre (Latin permanere). Of the names Reinette and Queening, the former was probably derived from Reginetta or Little Queen, the latter more likely from coin or quoin (angle), on account of the angular form of the fruit. So, too, Quince may have come from the same source, because of its ribbed fruit, rather than from the Cretan town of Cydon whence it was originally exported. The Calville or Calleville, as the apple itself is of Norman origin, is probably named from the commune of Caileville in the Département de l'Eure. Codling or Quodlin is not from "coddle," to parboil, but more likely from the rattling of its pips like pease in a cod. The old apple, Gennet Moyle, from Gennet a mule or hybrid, and Moyle a scion or graft, meaning therefore a hybrid produced by grafting. The Normans belong to the bitter-sweet group, and were probably named from Normandy, where that class of apples is highly esteemed today, and it was therefore unfortunate to attempt to substitute the name Hereford for Norman. Under Peaches, Pavies, Nectarines, and Brugnons, Hogg's inaccurate use of these terms is noted.—*M. F. Warner.*

1549. Earle, F. S. **S. M. Tracy as a botanist.** Torreya 21: 64–65. 1921.—Tracy's main work was with forage-plants adapted to the southern states [U. S. A.], but as a botanist his interests were chiefly taxonomic. Most of his activity was in field-work and collecting. He specialized in the grasses and their parasitic fungi. Most of his botanical papers deal with the latter group.—*J. C. Nelson.*

1550. Fawcett, William. **William Harris.** Kew Bull. *1921*: 31–32. 1921.—An appreciation by a colleague of Harris' work in connection with the government gardens in Jamaica and as collector and student of its flora. Harris died Oct. 11, 1920, in Kansas City, U. S. A.—*M. F. Warner.*

1551. Fink, Bruce. **Lincoln Ware Riddle, lichenist.** Bryologist 24: 33–36. *Portrait.* 1921.—Dr. Riddle (1880–1921) was born in Jamaica Plain, Massachusetts, graduated and received his doctorate from Harvard. His professional career was at Wellesley College, save for a year of study in Europe and a slightly longer period as assistant professor at Harvard. He had from youth been interested in botany, later specializing in lichens, in which group he was an authority. The bibliography includes 24 titles.—*E. B. Chamberlain.*

1552. G[érardin], E. **Quelques considérations sur les camphres de Bornéo et de N'gal. *Le camphre, parfum précieux, cosmétique et antipestilentiel au Moyen Âge.* [Consideration of Borneo and Ngai camphor, and camphor as a perfume, cosmetic and antipestilential in the Middle Ages.]** Parfumerie Moderne 14: 118–119. 1921.—Botanical sources and properties are given of Borneo camphor (*Dryobalanops aromatica*) and Ngai (*Blumea balsamifera*). From Rhazes (923 A.D.) it is inferred that the drug known in remote times was probably from *Dryobalanops* rather than *Laurus* (*Cinnamomum*) *Camphora*. The author gives historical notes on camphor as a perfume and the special receptacles made to contain it. Its use in Persia is recorded in 636, and it was in high esteem among the Arabs, in Egypt, India, and

China. At one time it was considered such an invaluable remedy against the plague that a triumphal column was erected in its honor in Verona.—*M. F. Warner.*

1553. Gérome, Joseph. **Au sujet de la Courge de Siam; valeur économique, origine, nomenclature. [On the "Siamese gourd," its economic value, origin, and nomenclature.]** Jour. Soc. Nation. Hort. France 22: 100–102. 1921.—The "Courge de Siam" was introduced to cultivation in 1824 under the name *Cucurbita melanosperma*, without any intimation of its place of origin. In 1854 it was found that it was extensively grown in China, where it was used as a fodder plant; this and certain other considerations led to the conclusion that it was a native of eastern Asia. In 1883, however, de Candolle threw doubt upon this theory, as all the wild species of *Cucurbita* known are from Mexico or California, and in 1899 J. N. Rose included this plant, under the name *C. ficifolia*, among the useful plants of Mexico, where it is known as "Chilacayote." In 1911 the Boletin de Fomento of Costa Rica noted the same plant as one known and used by the inhabitants of Mexico before the European discovery of America, and the name "Chilacayote" is given in the Diccionario de Atzequismos of Robelo, together with a description of the plant taken from Hernandez. The name is formed from two Nahuatl words: Ayotli or gourd, and Tzilac, smooth or polished; it has also been applied to the water melon, but improperly, as the characters of the latter do not correspond to those of the "Chilacayote." The horticultural names "Melon de Malabar" and "Courge de Siam" should be abandoned in favor of one suggesting the true native locality of this plant, while the Latin name *Cucurbita melanosperma* A. Braun, under which it was listed in 1824, without any description, by the Botanical Garden of Carlsruhe, should give place to *C. ficifolia*, under which it was first described in 1837 by P. C. Bouché.—*M. F. Warner.*

1554. Guenther, Fritz. **Friedrich Lucas.** Gartenwelt 25: 180. 1921.—He was the son of Eduard Lucas, founder of the Pomologisches Institut in Reutlingen and was born Oct. 30, 1842. Following his education as a gardener, which included training in the Baltet nurseries in Troyes, France, he assisted his father in the Institut, succeeding him as its head in 1882, and continuing in active service there until his death, Apr. 21, 1921. He wrote a number of books on pomology, and a revision of the Christ-Lucas Gartenbuch.—*M. F. Warner.*

1555. Jackson, B. D., and Spencer Moore. **Æneas MacIntyre.** Jour. Botany 59: 204–205. 1921.—These notes refer to James Britten's bibliographical notes on the Compendium of Smith's 'English Flora.'—*S. H. Burnham.*

1556. Jacob, Joseph. **Lambert, knight of the golden tulip.** Gard. Chron. 69: 174–175. *Fig.* 75. 1921.—This presents evidence in support of the theory that John Lambert, one of Cromwell's generals, was the first person to flower the Guernsey lily in England.—*P. L. Ricker.*

1557. Jacob, Joseph. **William Turner, divine and herbalist. "It's an ill wind"—The father of British botany—His private gardens—His influence on horticulture.** Garden 85: 2. *Illus.* 1921.—His Libellus de re Herbaria Novus (1538) is famous as the 1st English botanical work ever printed; his Herbal was issued in 1551, the 2nd part in 1562 and 3rd in 1568; while the most complete edition was brought out after his death, by his son, Peter Turner.—*M. F. Warner.*

1558. Keller, C. **Gartenbaulehrer Dr. Alexander Bode. [Dr. Alexander Bode, instructor in horticulture.]** Möllers Deutsch. Gärtner Zeitg. 35: 76. 1920.—Bode died Feb. 13, 1920, in his 60th year. He was at one time employed by Sander of St. Albans as an orchid-collector, was later at the head of a nursery, but since 1899 had been a teacher, and had been chief instructor in agriculture in the Städtische Oberrealschule of Chemnitz since 1912.—*M. F. Warner.*

1559. Kern, F. D. **The J. Roberts Lowrie herbarium.** Torreya 21: 79–81. 1921.—The Lowrie herbarium was presented in August 1920 to the Pennsylvania State College. Mr. Lowrie took up his residence at Warriorsmark, Pennsylvania, in 1853, as legal adviser and

general manager of a large iron manufacturing concern. His leisure was largely devoted to the study of the local flora. *Aster Lowrieanus* Porter was named in his honor. He left an herbarium of 2750 specimens, representing 144 families and 707 genera. The grounds about his house were converted into an arboretum, which is still in a fair state of preservation.—*J. C. Nelson.*

1560. [KIRCHNER, OSKAR VON.] **Die Biologische Reichsanstalt für Land- und Forstwirtschaft in Berlin-Dahlem. [The biological institute for agriculture and forestry at Berlin.]** Zeitschr. Pflanzenkrankh. 31: 196–197. 1921.—The Institute has begun to publish monthly a Nachrichtenblatt für den Deutschen Pflanzenschutzdienst (Notes of the German plant protection service), of which the 1st issue appeared July 1, 1921, with an introduction on its aims and scope by Dr. O. Appel, the director. Dr. H. Morstatt, of the same Institute, has prepared a bibliography of plant protection literature for 1920, which is published by P. Parey, Berlin. It consists of titles arranged in 4 classes, with an author index.—*H. T. Güssow.*

1561. KNUNKER, A. **Hans Freiherr von Türckheim.** Gartenflora 70: 19–22. 1921.—Hans von Türckheim was born May 27, 1853, and died at Karlsruhe, February 7, 1920. He spent over 30 years as German consul in Guatemala, and made extended botanical explorations in that country. After returning to Germany in 1908, he made a botanical trip to the Santo Domingo mountains in 1909–10. His Guatemalan collections, comprising many new species described in Botanical Gazette by John Donnell Smith, are covered by the latter's Enumeratio Plantarum Guatemalensium (1889–1907), and his Santo Domingo plants are treated in Urban's Flora Domingensis, Vol. VIII of Symbolae Antillanae. Türckheim was especially interested in orchids, sending to Dr. Hans Goldschmidt of Essen living specimens of many which had never before flowered in Europe, while his herbarium material in this family, with exception of that which remains inaccessible in the Reichenbach Herbarium in Vienna, is being handled by R. Schlechter and comprises many new species.—*M. F. Warner.*

1562. KRONFELD, E. M. **Jacquin des Jügeren botanische Studienreise 1788–1790. Aus den unveröffentlichten Briefen herausgeben. [Botanical travels of Jacquin the younger. From unpublished letters.]** Beih. Bot. Centralbl. II, 38: 132–176. *Fig. 1.* 1921.—The botanical notes found in the letters of the younger Jacquin (Joseph Franz Freiherr von Jacquin) are printed without comment. The journey was planned to take in all the botanical gardens, factories, and other places where botanists and chemists were to be found. The route was as follows: Prag, Karlsbad, Freiberg, Dresden, Leipzig, Halle, Berlin, Klanzthal, Göttingen, Aschaffenberg, Mainz, Bonn, Aachen, Maestricht, The Hague, Rotterdam, Leyden, Amsterdam, Utrecht, Brussels, London, Paris, Freiberg, Geneva, Basel, Zurich, Bern. The letters are to his father, mother, and brother. They tell especially of the new or interesting plants found in each place and the botanists met.—*L. Pace.*

1563. L[ACAITA], C. C. [Rev. of: BEGUINOT, AUGUSTO. **La Botanica.** *116 p.* Rome, 1920.] Jour. Botany 59: 147–148. 1921.

1564. LECLERC, HENRI. **Histoire de l'ail. [History of garlic.]** Janus 23: 167–191. 1918.—A study of the properties of the plant rather than its history in cultivation is here presented. The earliest record of its use as food goes back to the period of Cheops, about 4500 B.C., as Herodotus related that there was engraved on the great pyramid of Ghizeh the cost of the horse-radish, onions, and garlic consumed by the builders, exceeding 1600 talents of silver. The use of garlic became known to the Hebrews during their sojourn in Egypt, and the Greeks used it largely; Theophrastus attaches much importance to its culture. The literary lore of garlic is represented by quotations from many sources, from Aristophanes down to Daudet, and its medicinal virtues are traced from Hippocrates, Dioscorides, Galen, and Pliny, and the Arab physicians, down to modern recognition of its stimulant and antiseptic properties, and in particular its value in the treatment of certain infectious diseases and tuberculosis.—*M. F. Warner.*

1565. Leclerc, Henri. **La médecine des signatures magiques. [The doctrine of signatures in medicine.]** Janus **23**: 5-28. *Fig. 1-7.* 1918.—Theories which have been held down to comparatively modern times concerning the relation between the medicinal virtues of plants and their external aspects are discussed in 3 groups: (1) Signatures having the form of an organ, as the black seeds of Herb Paris, having the signature of the pupil, yielding an oil used in ophthalmia; (2) signatures suggesting the consistency or color of a secretion, haemorrhages being treated with plants having a ruddy color or juice; and (3) signatures reproducing the aspect of a disease or injury, including plants the parts of which suggest teeth or fangs, which were used for bites of dogs or serpents.—*M. F. Warner.*

1566. Leclerc, Henri. **Le cyprès.** [The cypress.] Janus **25**: 87-100. 1921.—It is one of the trees oftenest mentioned in the Bible, and its longevity, fecundity, evergreen foliage, and other qualities are symbols which made it important in the religious cult of the Chaldeans. Greek mythology regards it as the emblem of death and has several tales to account for its origin; in Christian symbolism it signifies not only the death of the just, but also eternal life. It had various industrial and medicinal uses among the ancients; in the Middle Ages its medical properties were eulogized by St. Hildegarde, whom the author quotes at some length, as also Crescenzi, and the unknown author of the Arbolayre. In modern medical usage, it is a powerful vaso-constrictor, with effects equal or superior to those of **Hamamelis virginica.**—*M. F. Warner.*

1567. [Lendner, Alfred.] **M. Paul Chenevard.** Bull. Soc. Bot. Genève **12**: 3. 1921.—This is a brief outline of the botanical activities of Chenevard, who died Dec. 30, 1919, in his 81st year.—*M. F. Warner.*

1568. Locy, W. A. **The earliest printed illustrations of natural history.** Sci. Monthly **13**: 238-258. *Fig. 1-10.* 1921.—In 1475 Conrad von Megenberg published his Puch der Natur, illustrated by woodcuts of plants and animals, which passed through 6 editions before 1500. There are 2 copies of the 1st edition in the J. Pierpont Morgan Library of New York from which the figures are reproduced. Tbe Gart der Gesuntheit (Mainz, 1485) contained 386 figures of plants and animals, some of which show a high degree of excellence.—*L. Pace.*

1569. Martell. **Deutsche Pflanzennamen. [German plant names.]** Gartenwelt **24**: 402-403. 1920.—For centuries there has been a rivalry between the Latin and vernacular names, but the Allgemeine Deutsche Sprachverein has thrown its influence in favor of the latter. This article gives origin and legends associated with many common German plants, and the derivation of some German names from those of other languages.—*M. F. Warner.*

1570. Martinet, Henri. **A nos lecteurs. [To our readers.]** Le Jardin **35**: 57. 1921.—There is announced the consolidation of Le Jardin and Le Petit Jardin Illustré with Revue Horticole, under the latter name, and with Martinet, of Le Jardin, as one of its editors.—*M. F. Warner.*

1571. Martinet, Henri, et Félicien Lesourd. **Avis à nos lecteurs. [Notice to our readers.]** Rev. Hort. **93**: 323. 1921.—Announcement is made of the absorption of Le Jardin, edited by Martinet, by the Revue Horticole, the 1st issue of the combined journal being that of July, 1921.—*M. F. Warner.*

1572. Mieli, Aldo. **Gli scienziati italiani, dall' inizio del medio evo ai nostri giorni. Repertorio biobibliografico dei filosofi—matematici—astronomi—fisici—chimici—naturalisti—biologi—medici—geografi italiani. [Italian scientists from the Middle Ages to our own times; a biobibliographical dictionary of Italian philosophers, mathematicians, astronomers, physicists, chemists, naturalists, biologists, physicians, and geographers.]** Vol. I, Part 1. *viii + 236 p., illus.* A. Nardecchia: Rome, 1921.—This 1st part includes sketches of the following persons who have contributed in various ways to botanical science: Luca Ghini (about 1490-1556), Bartolomeo Maranta (about 1500-1571), Bonaventura Corti (1729-1813), Melchiorre Guilandino (about 1520-1589), Luigi Anguillara (about 1512-1570), Giovanni Battista Amici (1786-

1863), Antonio Piccone (1844–1901), Giovanni Zanardini (1804–1878), and Giovanni Passerini (1816–1893), by G. B. DE TONI; Roberto de Visiani (1800–1878), Prospero Alpino (1553–1616), and Giulio Pontedera (1688–1737), by A. BEGUINOT; Antonio Figari (1804–1874) and Giacinto Cestoni (1637–1718), by G. STEFANINI. Full bibliographies are given, and most of the sketches are accompanied by portraits, with occasional reproductions in fac-simile of manuscripts.—*M. F. Warner.*

1573. MORTIMER, A. **Wesley's "Primitive Physics" [sic].** Chemist and Druggist **94:** 138–139. 1921.—The 1st edition of Primitive Physick is dated June 11, 1747, and the 32nd was published in 1828. This work, which was written during the busiest period of John Wesley's life, is devoted to remedies for common diseases and rules of health. The history of medicine is briefly outlined in its preface. The title-page of the 22nd edition (1788) is reproduced.—*M. F. Warner.*

1574. OAKLEY, R. A. **Dr. Tracy's retirement.** Amer. Flor. **56:** 801–802. *Portrait.* 1921. —William Warner Tracy was born in Hudson, Ohio, May 2, 1845. Graduating from Michigan Agricultural College in 1867, he was for a short time professor of horticulture there, but soon went on a farm at Old Mission, Grand Traverse county, Michigan, and there began the growing of seed peas. His unusual knowledge of plants attracted the attention of D. M. Ferry & Co., and from 1879 to 1903 he was connected with that firm, organizing their field trials, compiling catalogues, and working on problems of plant selection. He became the foremost authority in the country on varieties of vegetables, and as such was called in 1903 to the U. S. Department of Agriculture, where he has remained until the present, but is now retiring from active work.—*M. F. Warner.*

1575. PAMMEL, L. H. **In memoriam. Dr. Byron D. Halsted.** Proc. Iowa Acad. Sci. **26:** 31–33. 1919 [1920].—This is a brief sketch and appreciation of Dr. Halsted (1852–1918).—*M. F. Warner.*

1576. PEACHEY, G. C. **The two John Peacheys, seventeenth century physicians; their lives and times.** Janus **23:** 121–158. *1 fig.* 1918.—Researches are reported into the history of 2 men who are often confounded: John Pechey (1654–1718), M.A.Oxon., licentiate of the College of Physicians, author of The Compleat Herbal (1694) and A Plain Introduction to the Art of Physick (1697); and John Peachie (about 1632–1692), M.D.Caen, extra-urbem licentiate of the College of Physicians, who wrote a treatise on the virtues of "Cassunmuniar" in 1679.—*M. F. Warner.*

1577. PRAIN, DAVID. **James Ramsey Drummond (1851–1921).** Jour. Botany **59:** 174. 1921.—Drummond was an enthusiastic botanist, but published only a few papers, on *Agave, Furcraea, Grewia,* etc. Between 1874 and 1904 he served in the Punjab as Assistant Commissioner, District Judge, and Commissioner, and during his last months in the Indian Civil Service officiated as curator of the herbarium at the Royal Botanic Garden, Calcutta. On his retirement in 1905 he settled at Kew in the expectation of preparing a flora of the Punjab, but was obliged to abandon the project on account of failing health.—*M. F. Warner.*

1578. P[RAIN], D. **John Gilbert Baker 1834–1920.** Proc. Roy. Soc. London B **92:** xxiv–xxx. 1921.—Baker had a long and productive career as systematic botanist, mainly at Kew. He "owed his eminence as a systematic botanist largely to the circumstance that his floristic and monographic studies alike are imbued with the spirit of the philosophical natural historian impelled by a sense of duty to attack taxonomic problems. . . . . He had fully apprehended the effects of environment before oecology became a special study." A complete account of outstanding works and professional distinctions is given.—*Paul B. Sears.*

1579. RITZEMA BOS, J. **Mijn afscheid uit mijne ambtelijke betrekking. [My retirement from official relations.]** Tijdschr. Plantenz. **26:** 193–196. 1920.—In a brief introduction the author refers to the presentation of his portrait by his friends on Aug. 24. A list of the speakers on this occasion is given, followed by the speech of acceptance by the author.—*H. H. Whetzel.*

1580. ROSTER, GIORGIO. **Odoardo Beccari.** Bull. R. Soc. Toscana Ortic. **46**: 33–36. *Portrait.* 1921.—A brief account is given of the explorations and collections of Beccari (died Oct. 26, 1920), with a list of his principal writings on the Phoenicaceae. Other works which were left in manuscript are to be published by the writer.—*M. F. Warner.*

1581. RUSSELL, E. J. **The first printed book on agriculture.** Country Life [London] **43**: 276–278. *Illus.* 1918.—Notes are given on the Opus Ruralium Commodorum of Petrus Crescentius, 1st edition, printed at Augsburg by Johannes Schüssler in 1471.—*M. F. Warner.*

1582. SIEBERT, AUGUST. **Max Hesdörffer.** Gartenwelt **24**: 37–38. *Portrait.* 1920.—An obituary sketch is given of Hesdörffer (1863–1920), former editor of Gartenwelt, and author of a number of books on flower and ornamental gardening.—*M. F. Warner.*

1583. SOLIS, OCTAVIO. **Importancia de los jardines botânicos y algunas especies vegetales exóticas.** [Importance of botanical gardens and some exotic plants.] Rev. Agric. [Mexico] **6**: 78–84. *12 fig.* 1921.—A brief history of botanical gardens is given with a discussion of the value of such institutions. Attempts to build up gardens at Oaxaca and elsewhere in Mexico are related. A few rare exotic plants are described.—*John A. Stevenson.*

1584. T., C. **The origin of the name Clivia.** Garden **85**: 219. 1921.—Clivia was so named after the Duchess of Northumberland, a member of the Clive family, according to Johnson's Gardener's Dictionary, which does not state which Duchess, though the ducal title was instituted in 1766.—*M. F. Warner.*

1585. W[ATSON], W[ILLIAM]. **Henry F. C. Sander.** Kew Bull. **1921**: 33. 1921.—Sander, who died Dec. 23, 1920, in his 74th year, was head of the firm of Messrs. Sander and Sons of St. Albans and Bruges, the principal importers for many years of orchids and other tropical and subtropical plants. [See also Bot. Absts. 10, Entry 1536.]—*M F. Warner.*

1586. WEATHERBY, C. A. **Old-time Connecticut botanists and their herbaria—II.** Rhodora **23**: 121–125, 171–177. 1921.—This gives a short biographical sketch of Joseph Barratt, born in Derbyshire, England, in 1796, died at Middletown, Connecticut, Jan. 25, 1881. He emigrated from England to New York, in 1819, where he practised as a physician. He spent most of his life in Connecticut as physician, teacher, botanist, and geologist. His herbarium, preserved at Wesleyan University, is probably his most substantial and valuable achievement. His publications are here listed and the more important ones briefly discussed.—*James P. Poole.*

1587. WENSE, H. VON DER. **Forst- und Jagdgeschichtliches aus einer Lüneburgischen Gutsforst.** [History of forestry and game on a Lüneburg estate.] Zeitschr. Forst- u. Jagdw. **51**: 210–215. 1919.—An interesting account is given of the first application of forest methods by Christian F. L. von der Wense on the family land during the 18th century, and subsequent forest history. Wense took especial interest in the reforestation of heath lands by plowing and planting. The first planting was done by sticking into the ground pine twigs to which the cones were still attached, but the result was a failure.—*J. Roeser.*

1588. WINTON, A. L. **Thomas Franz Hanausek.** Amer. Jour. Pharm. **93**: 222–227. *Portrait.* 1921. These reminiscences present an insight into the keen scientific acumen and inspiring character of Thomas Franz Hanausek, who died at Vienna, on February 4, 1918, in his 66th year. The accompanying photograph bears Hanausek's signature and the motto to which he owed his success, "Das Beste im Leben ist die Arbeit."—*Anton Hogstad, Jr.*

1589. ZAHN, E. **Nachruf.** Gartenwelt **24**: 472. 1920.—This is an obituary of Han-Solereder (1860–1920), professor of botany and director of the Botanical institute and botanical garden of the University of Erlangen.—*M. F. Warner.*

1590. ZAUNICK, RUDOLPH. **Johannes Kentmann, 2. April 1518 bis 14. (oder 15.) Juni 1574.** Mitteil Gesch. Med. u. Naturwiss. 18: 177–183. 1919.—Kentmann, a physician of Meissen, in Saxony, published works on the fishes, birds, and fossils of that region. He contributed to botanical science through his correspondence with Conrad Gesner, and his manuscript "Kreutterbuch" with 600 beautifully painted plates, which was dedicated in 1563 to the Elector August of Saxony, is now preserved in the national library at Dresden. He was the father of Theophilus Kentmann (1552–1610).—*M. F. Warner.*

1591. ZEININGER. **Aus der Geschichte der Pfaueninsel. [History of the "Peacock Isle."]** Gartenflora 69: 154–159. *Fig. 19–23.* 1920.—Garden development of the banks of the Havel at Potsdam began under the Great Elector (1640–1688), with a vineyard and the setting of many trees, and on the "Peacock isle" with its beautiful oaks, he built a hunting lodge. It was for some time neglected, but under Friedrich Wilhelm II (1788–1797) considerable planting was done, and a gardener named Morsch was placed in charge of the island. Under Friedrich Wilhelm III (1797–1840) the planting was completed, Sans Souci and the "New Garden" contributing trees for the purpose. The succession of gardeners and erection of buildings are noted for this period of greatest development, after which the "Peacock Isle" has declined in magnificence, though always remaining a favorite resort.—*M. F. Warner.*

BOTANICAL EDUCATION

C. STUART GAGER, *Editor*

ALFRED GUNDERSEN, *Assistant Editor*

1592. ANONYMOUS. **Instrucciones para la formación de huertas escolares. [Instructions for making school gardens.]** Bol. Agric. Provincia Buenos Aires 1⁹: 2–5. 1920.

1593. ANONYMOUS. **The University of California wood exhibit.** Intercoll. Forest. Club Ann. 1: 28–29. *1 illus.* 1921.

1594. ANONYMOUS. [Rev. of: COOK, M. T. **College botany: structure, physiology and economics of plants.** *x + 392 p.* J. B. Lippincott Co.: Philadelphia and London, 1920.] Nature 107: 807. 1921.

1595. ANONYMOUS. [Rev. of: SMALL, J. **A textbook of botany for medical and pharmaceutical students.** *x + 681 p.* J. and A. Churchill: London, 1921.] Nature 107: 777. 1921.

1596. HANSON, C. O. **Forestry for woodmen.** *2nd ed., 228 p., 13 pl., 15 fig.* Clarendon Press, Oxford. 1921.—The book is based on Schlich's Manual of Forestry and is written to supply an inexpensive book on scientific forestry for foresters and woodmen. It was first drawn up for use of the School of Forestry for Working Men in the Forest of Dean. The work consists of 18 chapters, 2 of which, "The forestry act and forestry commission," and "The afforestation of waste lands," are not in the first edition.—*C. S. Gager.*

1597. HASTINGS, G. T. **The Boy Scouts and conservation of wild flowers.** Torreya 21: 83–84. 1921.—A merit badge is now offered to Scouts for the collecting, mounting, and labeling of 50 specimens of flowering plants. An essay of 200 words on the conservation of wild flowers is also required. Scouts are trained to protect plants and cautioned not to gather rare flowers.—*J. C. Nelson.*

1598. JOLY, J. **The universities and research.** Nature 107: 760–761. 1921.—(From a paper read before the Congress of the Universities of the Empire, at Oxford, on July 8.) "Perhaps the most striking feature of American universities, as viewed by a British visitor, is the prevalence of research and the lavish provisions made for its prosecution." Compulsory study of dead languages is considered seriously injurious to research in physical and natural sciences in that it keeps many out of the universities and consumes time which were better spent in study of living languages. Even a little elementary research is of great value

to the student. Lectures should be devoted to studies in research; these might be substituted for part of the regular lectures.—*O. A. Stevens.*

1599. MÖLLER. **Die Zukunft des höheren förstlichen Unterrichts in Preussen. [The future of higher forest instruction in Prussia.]** Zeitschr. Forst- u. Jagdw. 51: 353–400. 1919.—This academic discussion of the future of forest instruction in Prussia consists of 3 parts: (1) The question of the future of forest instruction in Prussia remains unsolved, and although there exists a present period of inactivity, efforts will have to be exerted to change existing conditions. (2) Raising the standard of the forest academies and the possible transfer of forest instruction to a university. Under present conditions, 2 forest academies cannot exist in Prussia, and the only evident solution in the author's opinion is to concentrate all instruction at the Eberswald academy. (3) How the forest academy of Eberswald can be developed into a full-fledged high school of forest instruction.—*J. Roeser.*

1600. NICHOLS, GEORGE E. [Rev. of: MARTIN, J. N. **Botany with agricultural applications.** *xii+604 p. 490 fig.* John Wiley & Sons: New York, 1920.] Torreya 21: 65–66. 1921.—This 2nd edition is designed as a text for agricultural students. Its aim is to teach the fundamental facts and principles of botany and relate these to problems of practical interest. [See also Bot. Absts. 8, Entry 1821.]—*J. C. Nelson.*

1601. R., A. B. **Four new text-books.** [Rev. of: (1) JONES, W. NEILSON, and M. C. RAYNER. **A text-book of plant biology.** *viii+262 p., 6 pl.,* 36 *fig.* Methuen: London, 1920. (2) COOK, MELVILLE THURSTON. **College botany, structure, physiology and economics of plants.** *x+392 p.* Lippincott: Philadelphia and London, 1921. (3) ASHTON, PERCIVAL J. **The Selborne botany for schools.** *viii+152 p.* G. Gill: London, (no date). (4) MARTIN, JOHN H. **Botany with Agricultural applications.** *2nd rev. ed., xii+604 p., 490 fig.* Wiley: New York, 1920.] Jour. Botany 59: 114–116. 1921. [See also Bot. Absts. 8, Entry 1821.]

1602. R., A. B. **Two text-books.** [Rev. of: (1) SMALL, JAMES. **A text-book of botany for medical and pharmaceutical students.** *x+681 p., 1350 fig.* Churchill: London, 1921. (2) BALLARD, C. W. **The elements of vegetable histology.** *xiv+246 p., 75 fig.* Wiley: New York; Chapman and Hall: London, 1921.] Jour. Botany 59: 236–237. 1921.

1603. SOSMAN, ROBT. B. **The distribution of scientific information in the United States.** Jour. Washington [D. C.] Acad. Sci. 11: 69–99. 1921.

CYTOLOGY

GILBERT M. SMITH, *Editor*
GEO. S. BRYAN, *Assistant Editor*

(See in this issue Entries 1677, 1685, 1716, 1717, 1720, 1871)

ECOLOGY AND PLANT GEOGRAPHY

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FOREST BOTANY AND FORESTRY

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(See also in this issue Entries 1465, 1547, 1587, 1593, 1596, 1599, 1784, 1878, 1882, 2027, 2028)

1604. Anonymous. **Das Ergebnis der Harzgewinnung in Preussen. [The yield from the resin industry in Prussia.]** *Zeitschr. Forst- u. Jagdw. 51: 415–416. 1919.—For the fiscal* year 1918, 2,288,661 kgr. of pine resin were produced at a cost of 4,187,186 marks, and 63,416 kgr. of Norway spruce resin at a cost of 42,434 marks. The net profit from the former was 117.05 marks, from the latter 83.08, and from Norway spruce wild resin (Fichtenwildharz) 50.95 marks per 100 kgr. It is believed that these returns should induce private forest owners to devote their holdings to the production of resin.—*J. Roeser.*

1605. Anonymous. **Forestry in the Union. The progress of state afforestation.** Jour. Dept. Agric. Union of South Africa 3: 155–159. 1921.—The policy of the Forest Department is to protect and conserve the indigenous timber forests and to utilize their products in such a way as to increase future productivity. The supply of timber will gradually become exhausted from these forests, which reproduce comparatively slowly. The future of forestry in South Africa therefore lies in the plantations of exotic trees, which are gradually being extended.—*E. M. Doidge.*

1606. Anonymous. **La madera de eucalipto. [Eucalyptus wood.]** Información Agric. [Madrid] 11: 243–244. 1921.—This is a discussion of the rate and manner of drying eucalyptus wood.—*John A. Stevenson.*

1607. Anonymous. **Quebracho.** Sci. Amer. Monthly 1: 189. 1920.

1608. Anonymous. **The Alexandria forests.** South African Gard. 11: 217–219, 257–276. 1921.—The Alexandria forests crown the 1st terraces of the coastal zone for some 30 miles. An account is given of the vegetations of these forests under 3 headings, littoral forests, private forests, and government forests.—*E. M. Doidge.*

1609. Anonymous. **The progress of British forestry.** [Rev. of: **First annual report of the forestry commission.** H. M. Stationery Office: London, 1921.] Nature 107: 753–754. 1921.

1610. Anonymous. **Utilidad de los arboles. [Use of trees.]** Inspección Nacion. Ganaderia y Agric. [Uruguay] Bol. 3 [2nd ed.]. *18 p.* 1920.—This popular discussion of the uses of forest products (wood, fruit, etc.), and the benefits derived from forest plantings includes directions for the planting and care of tree plantations.—*John A. Stevenson.*

1611. Alviella, Felix Goblet, d'. **La flore forestière dans la region des lacs italiens. [The forest flora in the region of the Italian lakes.]** Bull. Soc. Centrale Forest. Belgique 23: 573–589. *Fig. 1–3.* 1920.—The development of numerous introduced species is discussed, among others *Pinus palustris*, *Sequoia gigantea*, *S. sempervirens*, *Picea pungens*, and *P. Engelmanni.* Excellent development is reported for the speciés which were planted on the alluvial soils near the lake shores.—*W. C. Lowdermilk.*

1612. Arnold, H. H. **Aerial protection for our national forests.** Intercoll. Forest. Club Ann. 1: 13–16. *1921.—This article outlines the results of the first 2 years' aerial patrol in* California.—*Woodbridge Metcalf.*

1613. B. **Les Douglas de Sibret. [The Douglas fir plantations of Sibret.]** Bull. Soo. Centrale Forest. Belgique 23: 453–460. *1920.*—The remarkable growth of a Douglas fir plantation established in 1872 and 1878 by Count Visart is described. Unfortunately this plantation was cut by the German army.—*W. C. Lowdermilk.*

1614. Barrett, L. A. **Municipal camps in the national forests.** Intercoll. Forest. Club Ann. 1: 21–24. 1921.

1615. Bornemann, Crist. Ernst. **Ist es wirklich paradox, daferner Eichen- und Büchenholz anzuziehen, wo viele Jahrhundert grosse und geschlossene Eichen- und Büchenwaldungen gewesen, und streitet solches so sehr gegen Analogie, Erfahrung und Natur, als in 43ten und 44ten St. dieses Magazins angegeben worden? [Is it really a paradox to reproduce oak and beech in localities formerly occupied for centuries by large and dense stands of oak and beech, and does this argue so strongly against analogy, experience, and nature, as was indicated in the 43rd and 44th issue of this magazine?]** Zeitschr. Forst- u. Jagdw. 51: 106–109. 1919.—Forest soils contain, partly in themselves, partly as supplied by the existing stand, enough elementary ingredients to perpetuate and reproduce oak and beech stands. Otherwise such stands could not continue in the same locality for centuries, when the trees do not seed farther than the periphery of their crowns. The writer considers failures as due entirely to specific local conditions which hinder reproduction.—*J. Roeser.*

1616. Brown, N. C. **Spain and her scanty forests.** Amer. Forest. 27: 135–139. *11 fig.* 1921.—Forestry in Spain dates from 1835. The practice is more along aesthetic lines than in any other country. The forests consist very largely of pine and oak, though Eucalyptus and California redwood are common. In reforestation the European poplar is used extensively in the lower valleys and maritime pine in the mountains. Of the scant 12,000,000 acres of forest, properly so called, practically ¾ are privately owned.—*Chas. H. Otis.*

1617. Butler, O. M. **Research and boards. Need of establishing laboratories to study the problems of the lumber industry.** Sci. Amer. Monthly 3: 59–62. *6 fig.* 1921.

1618. Coolidge, P. T. **The situation in the pulp-wood region.** Intercoll. Forest. Club Ann. 1: 17–18. 1921.

1619. Crahay, N. I. **A propos du grand incendie de 1911 au voisinage de la Baraque Michel. [Concerning the big forest fire of 1911 in the vicinity of Michel Barracks.]** Bull. Soc. Centrale Forest. Belgique 23: 343–356, 391–405. 1920.

1620. Crahay, N. I. **La question forestière, question mondiale. [The forestry question is world wide.]** Bull. Soc. Centrale Forest. Belgique 23: 259–263. 1920.—Inasmuch as the world supply of wood is being consumed at an alarming rate, the attention of the League of Nations should be directed to the necessity of conserving the forests and to the afforestation of unproductive lands. The treatment of the forests on watersheds of international rivers should be governed by treaties. Only 8 countries (Austria, Hungary, Norway, Sweden, Finland, Russia, U. S. A., and Canada) are exporters. The reserve is already threatened, and only 3 countries (Sweden, Finland, and Canada) have a future in exports.—*W. C. Lowdermilk.*

1621. Drion, R. **Impôt forestier: Modifications. [Modifications in forest taxation.]** Bull. Soc. Centrale Forest. Belgique 23: 431–453, 491–511, 553–573. 1920.—This report is divided into 2 parts, the 1st being devoted to an account of legislation since 1826, and the 2nd to a discussion of past legislation and the application from the forester's point of view of a recent taxation law.—*W. C. Lowdermilk.*

1622. Drion, R. **Impôt forestier: Modifications. [Modifications of forest taxation.]** Bull. Soc. Centrale Forest. Belgique 24: 11–19. 1921.—This is a supplementary discussion of the report of the Commission Special, Conseil Superieur des Forêts [see preceding entry].—*W. C. Lowdermilk.*

1623. Eberts. **Empfehlenswerte Holzfällungs-maschinen. [Recommended wood-felling machines.]** Zeitschr. Forst- u. Jagdw. 51: 248–260. *Fig. 1–9.* 1919.—On the 14,000,000 hectares of forest land in Germany 24,000,000 cu.m. of sawtimber and 30,000,000 of fuel wood

(value 220,000,000 marks) are produced annually. In removing fuel wood, the stumps also are taken in many localities. Büttner has constructed 3 machines, "Baumwinde," "Hebelbaumrode machine," and "Zahnleisten-Waldteufel." The 1st may be used to push or pull over trees, the 2nd is a pushing machine, and the 3rd a pulling machine. Where thinnings and partial fellings are made, the pushing machines, which can control the fall, are preferred. The pulling machines are primarily for final and clear cuttings. In 80–90-year old spruce, beech, and oak stands, the 3rd machine can pull down 20–25 trees at a time, and 200–250 trees in a day.—*J. Roeser.*

1624. ECKBO, NILS B. **Industrial timber research abroad and in South Africa.** South African Jour. Indust. 4: 534–539. *6 fig.* 1921.—This, the 1st installment of a series of articles on the subject, gives an account of research institutions in the U. S. A., India, Canada, Australia, and England. The elimination of waste and improved utilization of forest products are essential in view of the world shortage of timber.—*E. M. Doidge.*

1625. FANKHAUSER. **Zur Kenntnis der Lärche. [The larch.]** Zeitschr. Forst- u. Jagdw. 51: 289–297. *Fig. 1–3.* 1919.—The degree of thrift and range of the larch depends upon plentiful and permanent soil moisture, not upon depth of soil. Surface dryness is overcome by the deep-growing main root and subsidiary "Senkerwurzeln," which often attain a length of 9 m. The enormous water loss by transpiration (as compared with spruce, pine, beech, etc.) is believed to explain the fact that larch is the only native deciduous conifer. The shedding, according to the author, avoids a conflict between transpiration and reduced water absorption. In extraordinary drought, larch maintains itself by its capability of shedding its foliage. Larch in mixture with Norway spruce (*Picea excelsa*) fails, not because of greater intolerance, but because the crown cover of spruce prevents precipitation from reaching the soil, while the shallow wide-spreading network of roots gradually produces a condition of dryness unfavorable to larch. Larch thrives in mixture with pine and beech, as neither of these effectively intercepts precipitation or competes for moisture as does spruce. In beech stands the surface layer of leaves effectively prevents surface desiccation.—*J. Roeser.*

1626. FRÖMBLING, C. **Achtet der niederen Pflanzenwelt! [Consider the lower vegetable kingdom!]** Zeitschr. Forst- u. Jagdw. 51: 33–37. 1919.—According to the author the lower forms of plant life in the forest offers a reliable indicator in solving many otherwise difficult problems. He expects that little success in natural regeneration will be attained by anyone not familiar with these plants. In general, the more productive a soil, the more abundant its lower flora, and the less the likelihood that a single species will become dominant. Conversely, the poorer a soil, the more meagre the plant covering, and the greater the chances of supremacy by a single species.—*J. Roeser.*

1627. GOOR, E. **En Perse.—Notes de voyage en octobre–novembre 1913. [In Persia:—notes of a journey from October to November 1913.]** Bull. Soc. Centrale Forest. Belgique 24: 1–11. 1921.

1628. GUTHRIE, J. D. **On the Murman coast.** Amer. Forest. 27: 155–159. *10 fig.* 1921.—The Murman coast is a part of Russian Lapland stretching from North Cape to the White Sea. This article touches here and there on the vegetation and forest growth of the region.—*Chas. H. Otis.*

1629. HAMMATT, R. F. ***California's redwoods and her highways.*** Intercoll. Forest. Club Ann. 1: 19–20. 1921.

1630. HEMMANN. **Forstliche Organization. [Forest organization.]** Zeitschr. Forst- u. Jagdw. 51: 401–406. 1919.—The profession of forestry in Germany has, up to the present time, failed to present a consolidated working unit. The forest superintendents (Ober-Förster) have organizations in practically all German states, and in several instances the lower classes of forest employees are united; but there is a more or less distinct line between these and the organizations of the separate states, which the author describes in detail. By

far the most efficient society is the recently organized Thüringia society of forest administrative officers, who are working toward scientific and politico-economic development of forestry and forest management and toward the consolidation of all the German societies of forest administrative officers into a national society. A meeting was planned for June 14–15, 1921.—*J. Roeser.*

1631. HENRY, AUGUSTINE. **The tallest yews in Europe.** Country Life [London] 50: 9–10. *2 fig.* 1921.—Professor Badoux has recently claimed that a yew 70½ feet high, growing wild in the forest of Chillon, Switzerland, is the tallest in Europe; but the Close Walks, near Midhurst in England, contain 3 trees respectively 89, 90, and 92 feet high. These are probably about 260 years old. In China and Japan the yew grows only about 50 feet high, but in western North America occasionally reaches 80 feet. The tall specimens of Midhurst probably are not surpassed in height, unless it be in the Himalayas.—*M. F. Warner.*

1632. HERTZ. **Staatsaufsicht fur den Privatwald.** [State supervision of private forests.] Zeitschr. Forst- u. Jagdw. 51: 177–184. 1919.—The author is opposed to communism in the forest as advocated by Kordvahr and Merten. He claims that in many instances small private forests are the only means of holding farmers on the land, and that with the sale of these private holdings to the state, the farmers will join the urban population. Many small private forests are better managed than the average state forests and in a way which better suits the economic needs of the country and secures the best use of forest labor. The state should aid private forests primarily by a good forest law, which, for the large forest, should provide for both regular technical supervision and forest organization. The law might also cover the much discussed subject of "capital cuttings," and help forest owners by providing loans which approximate the interest on capital invested in growing stock.—*J. Roeser.*

1633. HOLMES, J. S. **Damage to forests by hail in North Carolina.** Monthly Weather Rev. 49: 333. 1921.—A hail storm on April 28, 1921, did much damage in North Carolina forests, killing much young growth, defoliating trees, and breaking branches, and so weakening many of the pines that they will be easy victims of the pine beetle.—*E. N. Munns.*

1634. HOMANS, G. M. **Eighth biennial report of the State Board of Forestry of the State of California, 1919–20.** *64 p., 6 illus.* 1921.—This report quotes the act of 1919 creating a State Board of Forestry and outlines a state forestry policy for California under 4 important headings: (1) Control of forest fires; (2) disposal of slash; (3) acquirement of cut-over lands; (4) survey of watershed areas. Complete minutes are given of the meeting of the lumbermen of California with the State Board of Forestry on Nov. 5, 1920, which culminated in a roll call on the slash-disposal question. All present agreed to dispose of their slash. Since then 260 operators have agreed in writing to dispose of their annual slash in such a manner as to lesson fire hazard and save young growth. The new fire protective organizations of the state are described, and statistics on causes of fires, areas (by counties) burned over, etc., are given. Announcement is made of a state forest nursery on a 30-acre tract near Davis, where trees will be raised for forest and highway planting. A test of white fir (*Abies concolor*) and cottonwood (*Populus fremontii*) as substitutes for Sitka spruce (*Picea sitchensis*) for butter boxes, carried on at the Davis farm, resulted in the decision that both species give entire satisfaction when the boxes are properly paraffined and lined with parchment paper.—*Woodbridge Metcalf.*

1635. JAMESON, F. WALTON. **Notes on tree-planting in the Kimberley District.** South African Jour. Indust. 4: 504–511. 1921.—The country about Kimberley is hot, dry, and dusty, but at many of the railway stations trees have been established and are growing well. Most of the natural timber from Mafeking to many miles south of Kimberley has been felled and the veld, unprotected by trees, is subject to the full hot blast of the northwest winds. Witb due care certain hardy trees can be successfully grown, and for this purpose *Eucalpytus rostrata, Cypressus arizonica, Pinus halepensis,* and *P. longifolia* are recommended. Experimental plots have been planted in Kimberley.—*E. M. Doidge.*

1636. KIENITZ, M. **Vorschläge für die Hartznutzung 1919 auf Grund der Beobachtungen und Versuche in Chorin. [Suggestions on the tapping for resin, based on observations and experiments in Chorin.]** Zeitschr. Forst- u. Jagdw. 51: 6–32. *2 fig.* 1919.—The author describes in detail the results of experiments on tapping for resin, with especial reference to depth and width of wounding, location of wound, location and kind of receptacles, loss of resin by evaporation, kinds of cutting tools, etc. As a rule, each tree receives 2 blazes, on opposite sides, aggregating ⅔ of the circumference. Cutting is hegun above and continued downward, and is done every 2 days. A new tree is tapped as near the root swelling as possible, and in all cases the vessels are attached low enough to permit a summer's cutting without moving the vessel. To prevent loss of turpentine oil by evaporation, the resin is removed promptly.—*J. Roeser.*

1637. KIENITZ, M. **Was ist denn jetzt Mode: Saat oder Pflanzung? [What is the present style: sowing or planting?]** Zeitschr. Forst- u. Jagdw. 51: 417–436. *Fig. 1–9.* 1919.—Present conditions in Germany, large areas of cut-over land lying bare and man-power scarce, have developed the practice of producing new stands of pine by plowing, sowing with drill machines, and replacing failures by planting. As post-war conditions disappear, it is believed planting will again come into use. Natural regeneration is secured only after heavy seed years, and then only on areas entirely open, or shaded only at the side. Artificial sowing is successful only when the seedlings have a continuous moisture supply, since ordinarily a superficial root system is developed under the influence of the surface humus layer, and the plants therefore succumb easily during periods of drought. Planting is regarded as the only successful method, as a deep root-system is developed and the loosened soil in the planting holes brings about a better distribution of moisture. The author's experiments show that planting with a semi-conical spade produces better results and is cheaper than the other more elaborate planting methods, and that the cost of planting, calculated through the first 3 years, is actually less than the cost of sowing.—*J. Roeser.*

1638. KNESEBECK, VON. **Der Verkauf von Holz zur Selbstwerbung und Massnahmen zur Bekämpfung der Brennholznot auf dem Lande. [The sale of wood for removal and measures to be taken in combating the fuel-wood shortage.]** Zeitschr. Forst- u. Jagdw. 51: 83–97. 1919.—The author calls attention to the merits, in war and post-war times, of the new practice of letting the customer remove his own wood under the supervision of foresters, and outlines management plans for sales of sawtimber and removal of faggot wood under the system of "self-felling." A set of rules for controlling the fuel-wood supply and demand in the country is also given.—*J. Roeser.*

1639. KORDVAHR. **Der Wert von Waldbeständen. [The value of forest stands.]** Zeitschr. Forst- u. Jagdw. 51: 140–144. 1919.—Forest prices are not determined by the interest with which the yield is capitalized, but hy conditions which are independent of the yield. The difficulty of evaluating forest lands is due to the fact that only part of the principle can be converted into capital at once (tangihle value), the remainder attaining its full value only after a long time (intangible value). The profit is the sum of the excess in the value of the increment over the expenses; the sum of the yearly savings, with interest, is derived from the cultural expenses and is comparable to the final value of a rental which is paid at the close of each year and finally at the final cutting. The author regards it as noteworthy that the value of stands is greater when calculated by simple interest than by compound interest, even though a rate as low as 1 per cent is chosen for compound interest. The writer includes numerous equations for calculating values.—*J. Roeser.*

1640. KORDVAHR. **Gedanken über Zweck und Ziel der Forstwirtschaft. [The purpose and the goal of forest management.]** Zeitschr. Forst- u. Jagdw. 51: 1–6. 1919.—The question to be considered is whether a stand is to be managed to produce a maximum rate of interest or a product of greatest value. The author urges that the ethical and aesthetic values of the forest should be cultivated in preference to the material, and that the German forests should not be managed by those financially interested, but should be controlled by the state or community.—*J. Roeser.*

1641. Korstian, C. F. **Grazing practice in the national forests and its effects on natural conditions.** Sci. Monthly 13: 273–281. *Fig. 1–7.* 1921.—This is a brief statement of the problems and conditions affecting the question of when and how much grazing may be allowed, and of the advantages and disadvantages of forest grazing.—*L. Pace.*

1642. Kraussе, Anton. **Beobachtungen an Dasychira pudibunda L. gelegentlich des Eberswalder Frasses 1917. [Observations of Dasychira pudibunda in connection with the Eberswald attack of 1917.]** Zeitschr. Forst- u. Jagdw. 51: 265–272. *Fig. 1–9.* 1919.—The species was observed in limited numbers in Eberswald during 1915 and 1916, and in the fall of 1917 appeared in enormous numbers, devastating the beech forests and attacking the hornbeam. Pine trees, too, were infested but no needles were consumed. No satisfactory explanation has been offered for this infestation, migration being out of the question. The color variation in the caterpillars was of interest, black ones being in the majority. All caterpillars were diseased ("polyederkrank"). The hair of the caterpillar produced no disagreeable effects in contact with the skin, though it is generally considered extremely irritating. [See also Bot. Absts. 10, Entry 1644.]—*J. Roeser.*

1643. Krausse, Anton. **Ennomos quercinaria Hfn. (Lep. Geom.) als Waldverderber. [Ennomos quercinaria Hfn. (Lep. Geom.) as a destroyer of forests.]** Zeitschr. Forst- u. Jagdw. 51: 153–159. *Fig. 1–6.* 1919.—This insect, reported as a forest pest for the 1st time in 1917, appeared in the forest district of Saarbrücken. Suppressed beech were attacked first in May; dominant trees, 80–100 years old, later. The pupa is easily identified by 4 large hook-like appendages at the posterior end and 2 smaller appendages on each side nearby. The butterfly's habits and life history are described.—*J. Roeser.*

1644. Krausse, Anton. **Über Dasychira pudibunda L. bei Eberswalde *1918*. [Dasychira pudibunda in the Ebers forest in 1918.]** Zeitschr. Forst- u. Jagdw. 51: 445–447. *1 fig.* 1919.—This is a brief account of further studies of *Dasychira pudibunda*. All eggs, caterpillars, and butterflies examined were "polyeder" diseased, though many individuals are apparently immune. Although the disease caused terrific destruction during 1917, it did not prevent a light devastation by this insect in 1918.—[See also Bot. Absts. 10, Entry 1642.]—*J. Roeser.*

1645. LaVarre, W. **Brazil's white gold.** Sci. Amer. Monthly 3: 133–136. *5 fig.* 1921. [Abstract from Bull. Pan American Union 50: 462–476. 1920.—This is an account of the *primitive methods still used in collecting the milk of the rubber tree.—Chas. H. Otis.*

1646. Lindsay, H. A. F., and C. M. Harlow. **Report on lac and shellac.** Indian Forest *Rec. 8[1]: 1–162. 10 charts, 4 pl., 1 map. 1921.—Despite its importance to India, lac is still* collected in a crude and wasteful manner, mostly from wild forest trees by ignorant native villagers, and marketed without economic foresight. Scientific knowledge of the lac insect and its hosts, of the physiological processes involved in lac production, and of climatic and other influencing factors, is meagre; and research has been unaccountably neglected.—The lac insect, *Tachardia lacca,* sucks the juices of the host plant and produces an unusually massive secretory or excretory incrustation. This is the amber-colored, resinous lac, from which shellac is manufactured. The female insect lives about 6 months, and produces 2 broods of minute larvae, which emerge in "swarms" during the time the lac harvests are made. Only the more obvious phases of the life history are known. In addition to the physiological processes involved in lac formation, some of the problems awaiting solution are: Effect (upon quality of lac) produced by the amount and quality of food obtained from the 6 or 7 major and 15 or more minor host plants; vitality and hardiness of the several strains of lac insects and their efficiency as lac producers; effect of weather and climatic conditions upon the efficiency of the insect; natural enemies of the insect and of the host plants. Considerable work has been done upon the last question in the way of identifying the more important parasites of the lac insect; but little is known of their habits, life histories, and distribution, or of their relative destructiveness, and means of combating them. The best lac is the "kusmi," or winter crop, from the kusum tree (*Schleichera trijuga*) found in the sub-

Himalaya area, Chota Nagpur, Orissa, and Burma. This tree occurs scattered in high dense forests, grows very slowly, and pollards less vigorously than most other lac host trees. Cultivation by the natives is unintelligent, and, as high lac prices lead to excessive harvesting, the brood lac supply is depleted. Methods of controlling the infection of new host branches or trees by new broods are particularly haphazard and their study and improvement is urgently needed. Quality of lac varies with host and insect, season, and locality. Present practices are described in detail and suggestions for improved practice and needed investigation are given.—*C. L. Hill.*

1647. MUELLER, M. L. **Kiln drying more lumber on the Pacific Coast.** Intercoll. Forest. Club Ann. 1: 35–37. 1921.

1648. MÜLLER. **Forstliche Mitteilungen aus dem preussischen Solling. [Forest information from the Prussian Solling.]** Zeitschr. Forst- u. Jagdw. 51: 225–247. 1919.—The author describes the geology, climate, forest, hunting, and chief administrative features of the forest-inspection district of Hildesheim-Solling and of the adjacent state forests of Northeim, Moringen, and Einback, which include approximately 36,035 hectares. The forest in this district is 60 per cent beech, 30 Norway spruce, and 10 oak. The principle aim is to perpetuate the beech, which is increasingly valuable. On the Bunter sandstone formation, which predominates in the Solling, good masts alone produce results, and these occur, on an average, every 8 years. The failure of reproduction on sandstone is due to destructive fungi, which thrive in insufficiently decomposed leaf humus. Failure to secure beech reproduction naturally has led to a system of seed fellings based on 4 preparation fellings extending over 20 years, a seed felling, and final cuttings. It is preferred that the soil litter decompose naturally, but advantage should be taken of good seed years, and the humus should be raked into piles often or the soil treated by harrowing, plowing, grazing swine, etc. In the preparation cuttings, protection of the stand against too great opening is more important than removal of forked and other undesirable trees. [See Bot. Absts. 9, Entry 187 and following entry.]—*J. Roeser.*

1649. MÜLLER. **Forstliche Mitteilungen aus dem preussischen Solling. [Forest information from the Prussian Solling.]** Zeitschr. Forst- u. Jagdw. 51: 301–307. 1919.—The present method of establishing oak in the beech forests of Prussian Solling, selected after much experimenting, is by dibbling under beech stands at the time of the regeneration cutting or during beech seed years. The previously used Martzfeld method proved too expensive. The oak is allowed to start up with the beech reproduction, which prevents its destruction by game (a serious menace to oak reproduction in this region), and advance beech saplings are cut down to avoid interference with the oak. Wherever dominant oaks are found in the Solling in equal-aged mixture with beech, 2 facts are evident: The site is sunny and the species is *Quercus sessiliflora.* On cool, shaded sites the oak is always suppressed. *Q. sessiliflora* succeeds better than *Q. pedunculata* since it has a shallow root system, thrives in shallow soil, and mixes better with beech. Planting in rows or groups is preferable to single planting because (1) oak is for sentimental reasons favored in cutting, contrary to the best economic interests, and (2) when the stand is opened the trees develop trunk sprouts and invariably become stag-headed.—*J. Roeser.*

1650. NELSON, J. C. **Deam's trees of Indiana (revised edition).** [Rev. of: DEAM, CHAS. C. **The trees of Indiana. First revised edition.** Dept. Conservation Indiana Publ. 13. *317 p., 134 pl.* 1921.] Rhodora 23: 179. 1921.—This is a brief account of the most noteworthy changes which have been made in the revision.—*James P. Poole.*

1651. OERTZEN, VON. **Erfahrungen aus dem Walde. [Experiences from the forest.]** Zeitschr. Forst- u. Jagdw. 51: 39–41. 1919.—The author discusses the habits and value of blueberry (*Vaccinium myrtillus*) and of heather, and the factors entering into hardpan formation.—*J. Roeser.*

1652. OLIVER, G. D. **History of Sierra Nevada lumbering industry.** Intercoll. Forest. Club Ann. 1: 30–34. 1921.

1653. PEARSON, R. S. **Note on the contraction of sal (Shorea robusta) timber while seasoning.** Indian Forest. 47: 245–247. *1 chart.* 1921.—A section of green sal plank 1 inch thick and 12 inches wide contracted 0.455 inches in width, the rate being fairly uniform and following the moisture content of the wood. During times of high humidity the plank expanded slightly.—*E. N. Munns.*

1654. QUAIRIÈRE, C. J. **L'arboretum de Gedinne. [The arboretum of Gedinne, Belgium.]** Bull. Soc. Centrale Forest. Belgique 24: 19–31. 1921.—The 2 genera *Abies* and *Picea* are classified by species according to their reaction to the locality at Gedinne. Of the exotics the species of *Abies* which made very good growth are *A. grandis, A. balsamea, A. fraseri, A. concolor, A. Veitchi, A. pectinata; of Picea the species which made good growth are P. Sitchensis, P. omorika, P. bicolor.* Other species of both genera fall into 2 lower classifications. The account is to be continued.—*W. C. Lowdermilk.*

1655. R., E. **Faut-il exploiter les pineraies ravagées par la nonne et la noctuelle du pin? [Is it necessary to cut the pineries damaged by pine defoliators?]** Bull. Soc. Centrale Forest. Belgique 23: 405–408. 1920.

1656. RECKNAGEL, A. B. **Is forestry succeeding?** Intercoll. Forest. Club Ann. 1: 11–12. 1921.

1657. RINDL, M. **Some sources of non-drying oils.** South African Jour. Indust. 4: 641–649. 1921.—The Bulletin of the Imperial Institute has published investigations of the oil from *Balanites Mangnamii*, which abounds in Portuguese East Africa. The oil is said to equal in value refined cotton seed oil.—The seed of *Calodendron capense* yields a pale yellow oil, which would be suitable for soap making.—The seed of the baobab tree, *Adamsonia digitata,* yield too little oil to render them commercially valuable. The oil from the Marula nut, *Sclerocarya caffra,* would be suitable for soap manufacture and possibly for edible purposes, but the low percentage of kernel in the fruit and the difficulty of cracking the nuts and separating the kernels makes it unlikely that it will become commercially valuable. The Cashew tree, *Anacardium occidentale,* flourishes in Portuguese East Africa and should grow well in the more tropical districts of the Union. In view of its value as a substitute for almonds the cultivation of the Cashew nut holds considerable prospect of success. Oils derived from *Ximenia americana, X. caffra,* and *Telfairia pedata* are also discussed.—*E. M. Doidge.*

1658. ROESSLER. **Das rheinische Wirtschaftsbuch als Teil des Betriebswerkes und der Betriebskontrollen. [The Rhenish control book as a part of the management plan and the management control.]** Zeitschr. Forst- u. Jagdw. 51: 436–438. 1919.—The usual valuation books, special cards, control books, etc., are not suited for use in the woods. The author presents the outline of a management book copied, with minor improvements, from that of the Rhenish communal forest administration, and recommends it to all forest managers—*J. Roeser.*

1659. SCHNAASE. **Die formelle Behandlung der Betriebsregulierungen nach dem Kriege. [The formal treatment of forest working plans after the war.]** Zeitschr. Forst- u. Jagdw. 51: 98–103. 1919.—It is conservatively estimated that ¼ of all Prussian forest districts are in need of new working plans, as post-war conditions make the preparation of plans under the old instructions impossible. Therefore, temporary plans should be prepared to insure a continued wood supply during the 1st period (approximately 20 years). Suggestions as to ways and means of formulating and carrying out this work are included.—*J. Roeser.*

1660. SCHRÖDER, H. **Bodenrückgang unter Fichte. [Soil retrogression under Norway spruce.]** Zeitschr. Forst- u. Jagdw. 51: 439–444. 1919.—The author investigated 2 small areas planted to Norway spruce in 1840–1845 and since cleared. These were located on the

east coast of north Sleswick in a broad-leaf forest composed chiefly of beech. The terrain was rolling and the soil a fresh, slightly sandy loam. In both areas the spruce has changed the soil, through the influence of a mossy covering, especially *Polytrichum*, into a decided hard pan in 65–70 years. This effect was most pronounced in the center of the spruce stand and disappeared under the surrounding beech. According to the author it is caused by the formation of raw humus under the heavy spruce cover and the leaching of the soil by humic acid. The present tendency to convert poorly reproducing beech stands into spruce should therefore be critically considered.—*J. Roeser.*

1661. SCHUBERT, JOH. **Ertrag eines Normalwaldes.** [Yield of a normal forest.] Zeitschr. Forst- u. Jagdw. **51**: 260–265. *Fig. 1–2.* 1919.—The author discusses forest, soil, and total net yields in normal stands of Norway spruce, on the basis of yield tables by Schwappach. Representing the net forest revenue (r) as a function of the rotation (u), and a slight increase in period of rotation as Δu and the corresponding change of r as Δr, the net forest revenue reaches its highest value when $\frac{\Delta r}{\Delta u}$ equals zero, which is with a rotation of 113 years. The author concludes that the rotation u_b yielding the greatest soil revenue is expressed by the formula $\frac{\Delta r}{\Delta N} = \frac{p}{100}$, where N represents the normal supply. At the following rates of interest, 1, 1.5, 2.0, 2.5, 3.0, 3.5, and 4.0 per cent, the rotation is respectively 92, 81, 74, 69, 65, 61, and 58 years. The total net revenue culminates in a higher rotation than the soil net revenue.—The average increase in lumber prices in the Prussian state forests during the period 1833–1912 approached 1.5 per cent annually.—*J. Roeser.*

1662. SCHWAPPACH. **Neuere Untersuchungen über dem Wachstumsgang der Schwarzerlen-Bestände.** [Investigations of growth rate of black alder [*Alnus glutinosa* Gaert.] stands.] Zeitschr. Forst- u. Jagdw. **51**: 184–190. 1919.—A comparison of results of investigations in 1918 with results of a single observation in 1902 shows: (1) The total increment of black alder stands is only a little higher in 1918, and the difference occurs in the period following the 40th year; (2) 40–45 per cent, instead of 30 per cent, of the total increment is removed in thinning; (3) the current annual increment and the average annual increment attain a maximum in comparatively late years, the former at approximately 45, the latter at 70 years. In general, coppice can no longer be considered suited to black alder. A normal yield table for black alder is included.—*J. Roeser.*

1663. SEELEN, VON. **Der Wald als Bruder des Feldes.** [The forest as brother of the farm.] Zeitschr. Forst- u. Jagdw. **51**: 308–315. 1919.—This article is a humorous rebuttal of forester Mertens' opinion that certain forest rights-of-users (Waldgrundgerechtigkeiten) should be discontinued. Mertens would place the collection of dry, fallen wood under a permit system, but Seelen argues that this would result in petty trespass. The former also favors the establishment of permanent forest pastures in preference to the use of forests for grazing; but even if only ⅓ of Germany's cattle were grazed in such pastures, approximately 2,000,000 hectares of the best forest soil would have to be set aside, which would be a great economic mistake. Although the results of rights of pannage (Mastnutzung) have not been successful, this practice should be given a thorough test.—*J. Roeser.*

1664. SEVERIN, G. **Un insecte nuisible au chêne.** [An insect injurious to oak.] Bull. Soc. Centrale Forest. Belgique **23**: 270–279. *Fig. 1–11.* 1920.—*Kermes quercus* (L.) CKLL or *K. reniformis* (Fourcr.) Sign. was found to be the insect causing damage to woods in the Meuse and Sambre valley. The life history of the insect is given. A bibliography is added.—*W. C. Lowdermilk.*

1665. SEVERIN, G. **Un insecte nuisible au chêne.** [An insect injurious to oak.] Bull. Soc. Centrale Forest. Belgique **23**: 314–323. *Fig. 12–21.* 1920.—The life histories of Coccinidae are continued and an account of *Lecanium* and *Kermes quercus* is included.—*W. C. Lowdermilk.*

1666. Severin, G. **Un insecte nuisible au chêne. [An insect injurious to oak.]** Bull. Soc. Centrale Forest. Belgique 23: 367–376, 408–415. *Fig. 22–23.* 1920.—The economic aspects of the damage done by *Kermes quercus* is discussed. Several methods of combating the insect are given, but none holds out much promise. The insect being little known, there is some confusion regarding classification. The author feels justified in retaining the name *Kermes quercus*.—*W. C. Lowdermilk.*

1667. Siecke, E. O., and L. Wyman. **Tree planting by farmers for fuel, fence posts and shelter.** Texas Agric. Exp. Sta. Forest. Bull. 13. *24 p., 10 fig.* 1920.—The treeless area of the state is the Panhandle, west Texas, below the caprock, and the Trans-Pecos country. This was the cattle country but dry farming has replaced cattle raising. Protection from sand storms and drying winds may be partially secured by planting trees, about 6 rows making an effective windbreak. The scarcity of fuel and fence posts makes a grove of trees desirable on every farm in this area. The species suited to different localities, the question of seedlings and transplanted stocks, renewals of windbreaks and woodlots, spacing, cultivation, and cost are briefly discussed.—*L. Pace.*

1668. Sim, T. R. **Tree planting for the farm II.** South African Jour. Indust. 4: 472–478. 1921.—In this installment directions are given for preparation of the land, raising of seed, planting out, and sowing in situ.—*E. M. Doidge.*

1669. Sim, T. R. **Tree-planting for the farm III.** South African Jour. Indust. 4: 554–562, 666–672. 1921.—The financial aspect of tree-planting is considered, and directions given for cultivation and thinning. Trees suitable for planting in various districts are listed, and the merits of various species for commercial planting are discussed.—*E. M. Doidge.*

1670. Warner, H. H. **The size of yew trees.** Garden 85: 156, 205. *Illus.* 1921.—This contains 2 notes on venerable trees and their dimensions, data for the 1st being taken largely from The Yew Trees of Great Britain and Ireland, by Dr. John Lowe. The 2nd gives some additions and corrections of measurements and an illustration of the yew by Iffley Church near Oxford. This, according to tradition, is as old as the church, which was built in 1175.—*M. F. Warner.*

GENETICS

George H. Shull, *Editor*
J. P. Kelly, *Assistant Editor*

(See also in this issue Entries 1448, 1463, 1477, 1478, 1479, 1480, 1488, 1515, 1523, 1545, 1642, 1753, 1757, 1762, 1776, 1787, 1789, 1790, 1822, 1839, 1918, 1963, 2047)

1671. Anonymous. **Increasing yields by bud selection.** Agric. Gaz. New South Wales 32: 698. 1921.—This consists essentially of quotations from an article by E. B. Babcock of California, warning against too much optimism in bud selection in deciduous fruits.—*L. R. Waldron.*

1672. Anonymous. **Measuring intelligence.** Jour. Heredity 11: 86–87. *1 fig.* 1920.—This is a report of the findings of the Committee on Army Mental Tests of the American Psychological Association and National Research Council. Test ratings furnished a fairly reliable index to ability to learn, think quickly and accurately, analyze a situation, maintain a state of mental alertness, comprehend and follow instructions. Test score was little affected by schooling. There was no proof that men of equal mental rating were of equal military worth. Temperamental qualities could not be measured, yet a superior degree of loyalty, bravery, and leadership was more often correlated with superior intelligence than otherwise. Intelligence rating was found to be one of the most important aids in selecting men for specialized tasks, and corresponded closely to pre-army occupational levels, i.e.: (1) Lowest

mental test ratings were made by unskilled and semi-skilled laborers capable of routine work as privates; (2) many skilled laborers and clerical workers showed capacity to serve as non-commissioned officers; (3) semi-professionals made up a large percentage of the commissioned officers; (4) professional men of highest intellectual type furnished the most superior officer material.—*M. C. Gould.*

1673. Anonymous. **The heredity and environment of a great botanist.** Jour. Heredity **11:** 6. 1920.—This article gives the writer's impressions on reading Leonard Huxley's Life and Letters, by Sir Joseph Dalton Hooker.—*Merle C. Coulter.*

1674. Anonymous. **Variation in scarlet runner beans.** Gard. Chron. **69:** 176. 1921.—J. de Vilmorin displayed before the French National Horticultural Society a series of seed-color variations in beans from natural crosses between scarlet runner, *Phaseolus multiflorus,* and a black-seeded form of the same species. By the 2nd year 10 new colors had appeared. "Most of the possible combinations between the colors, 'wine-color,' black, gray, and maroon, were displayed, in many different kinds of marbling, varying in intensity and extent." No attempt was made to analyze the phenomena from the Mendelian standpoint. Comparison is made of the anthocyanin content of these beans.—*L. R. Waldron.*

1675. Anonymous. **Deficiency in intellect found to be correlated with deficiency in the number of brain cells.** [Rev. of: Ellis, Robert S. **A preliminary study of the Purkinje cells in normal, subnormal, and senescent human cerebella, with some notes on functional localization.** Jour. Comparative Neurol. **30:** No. 2. Feb. 1919.] Jour. Heredity **10:** 369. 1919.—Examination of a number of cerebella showed that the number of Purkinje cells varies under different conditions. In cases of paresis, extreme old age, and idiocy, the number of Purkinje cells is reduced by disintegration, and there is deficiency in motor coordination. This raises the question as to the extent to which differences in percentage of cells may be the anatomical basis for mental defect. The author contends that all such cases are due to some form of antenatal degeneration.—*M. C. Gould.*

1676. Allen, W. J. **Gravenstein grafts at Bathurst.** Agric. Gaz. New South Wales **32:** 511. 1921.—Evidence goes to show that the stock exerts an effect upon the scion, resulting in a "twisting" effect which is absent in the tree from which the scions were taken.—*L. R. Waldron.*

1677. Bataillon, Charles. ***Spermies couplées et hétérochromosome dans la lignée* typique d'une Turritelle.** [**Paired sperms and heterochromosome in the typical line of a Turritella.**] Compt. Rend. Soc. Biol. **84:** 219–222. *1 fig.* 1921.—Spermatozoa of *Turritella communis* are found in pairs more or less closely united throughout their length. This rare phenomenon was observed in the Opossum by Selenka and in Dytiscidae by Ballowitz, but its origin was studied only superficially or not at all. In *Turritella* it has its origin in maturation. The 2nd maturation division results in 2 distinct cells, which later fuse into practically a binucleate cell. Development of the pair has been traced through all stages to adult spermatozoa. Presumably they separate at or before fertilization, but this has not been proved. The 1st maturation division is unequal, 1 secondary spermatocyte receiving a larger chromosome than the other. From each secondary spermatocyte comes 1 pair of spermatozoa, hence these pairs are of 2 kinds. If heterochromosomes of the 1st division are X and Y, some pairs are male-producing, others female-producing.—*A. Franklin Shull.*

1678. Bateson, W. **Root-cuttings and chimeras. II.** Jour. Genetics **11:** 91–97. *Pl. 13–14.* 1921.—The author reports the occurrence of a red double-flowered Bouvardia from root cuttings of the double pinkish white Bridesmaid variety, also of a single-flowered form from root cuttings of the new double red variety, and lists 12 varieties whose progeny from root cuttings were exactly alike. Other anomalies in flower and foliage color arising from root cuttings are noted.—Three sports arising from root sprouts of cuttings of fancy named varieties of *Pelargonium* are described, and differences between "type" and "sport" foliage and

flowers in the "Golden Flame" variety of *P. zonale* are treated in detail. The inclusion of cells belonging to one form within tissues of the other is especially noted.—A variegated form of *Spirea Ulmaria* devoid of functional germ cells resembles the totally sterile "Freak of Nature" zonal Pelargonium described earlier. This shows that, although varieties producing new forms from root cuttings may be regarded as periclinal chimeras, other possibilities must be remembered. Many herbaceous variegated plants arranged periclinally may give shoots composed entirely of either internal or external constituents. These are not always endogenous, but may be originated by a periclinal division in the cortical layers. Attempts to breed root cuttings with parent plants have been unsuccessful.—*E. B. Babcock.*

1679. BERRY, REGINALD ARTHUR, AND DANIEL GRANT O'BRIEN. **Errors in feeding experiments with cross-bred pigs.** Jour. Agric. Sci. 11: 275–286. *2 fig.* 1921.—In experiments in feeding two lots of pigs, one of 43, and another of 46, each for 16 weeks, conditions were so nearly comparable that combining results of the 2 trials was permissible for statistical purposes, as proved by mathematical test. The probable error in rate of gain for 1 pig, in terms of average daily gain, was 7 per cent; for pure-bred pigs of the same litter and of similar live weight, 3 per cent; and for cross-bred pigs of similar weight but of different parents, 4 per cent. The error, greatest for a short feeding period, decreases rapidly week by week up to 7 weeks, after which the rate of decrease is slow. The errors on 18 separate pens of 4 pigs each varied from 2.3 to 12.08 per cent, averaging 6.21 per cent. An increased daily rate of gain decreases the probable error; the converse is also true. The rate of gain in female pigs was depressed slightly by a period of heat, but the difference between gilts and barrows was only 0.02 pounds. The stage of fattening did not affect the error, although well-fattened animals showed a greater range in rate of gain than those only partially fattened.—*Edward N. Wentworth.*

1680. BLAKESLEE, ALBERT F. **Mutations in mucors.** Jour. Heredity 11: 278–284. *3 fig.* 1920.—In the examination of about 38,000 progeny of single asexual spores from cultures of the hermaphrodite mould, *Mucor genevensis*, many variant forms were seen. In the subsequent asexual generations of most of these forms the normal strain appeared and gradually predominated to the exclusion of the variant. However, 2 of these mutants have been shown to be stable, at least for many generations. The "Dwarf" mutant lacks asexual spores and also zygospores, and has been grown unchanged for nearly 7 years. Mutant "A" lacks hermaphrodite zygospores, has a strong minus sexual reaction, and only a feeble plus one. This form has been grown for 16 generations and appears stable. Among the inconstant mutants, "X," a hermaphrodite with a plus tendency, had low white growth and large zygospores; in the course of years its cultures reverted to the normal type. Mutant "D," which had a yellowish dense growth and was almost without zygospores, had a minus tendency, and seems to have finally reverted. The "Yeast" mutant was composed of separate cells in its early stage of growth. In the course of time only normal forms were found among the progeny.—*John Belling.*

1681. BLARINGHEM, L. **A propos de l'hérédité des fascies de Capsella Viguieri. [Concerning the heredity of fasciations in Capsella Viguieri.]** Compt. Rend. Acad. Sci. Paris 169: 298–300. 1919.—This unique plant, named and described by the author in 1910, is claimed to be the best known example of the sudden birth of a new species. For 12 generations the tendency to produce fasciated stems has been maintained as a constant character. The only other true-breeding fasciated species known is cock's-comb, *Celosia cristata* L. In both species the fasciated character is amplified by cultural conditions favoring vegetative development, i.e., by transplanting to rich soil under glass. De Vries has pointed out an apparent relation between fasciation and tricotyledony in *Amaranthus retroflexus*, but in *Capsella Viguieri* the author observed but 4 tricotyls among 3000 seedlings examined.—*Merle C. Coulter.*

1682. BLISS, A. J. **Unusual forms of Iris flowers.** Gard. Chron. 70: 149. 1921.—Of abnormal flower forms the tetramerous occurs most frequently among the author's seedlings

and is coupled generally with vigor of growth, though many of the most vigorous seedlings have never produced abnormal flowers. It is suggested that these forms may partake of the nature of peloria and that the tendency to produce tetramerous flowers is heritable, despite the fact that such flowers may appear on one spike and not on adjacent ones, or during one season and not another, showing that something additional is necessary for their occurrence.—*J. Marion Shull.*

1683. BOULENGER, E. G. **Experiments on colour-changes of the spotted salamander (Salamandra maculosa), conducted in the Society's gardens.** Proc. Zool. Soc. London **1921**: 99–102. *2 pl., 1 fig.* 1921.—In undertaking to repeat some of Kammerer's experiments on the action of changed environment on certain amphibians, the author separated 32 new-born young from a single *Salamandra maculosa* var. *taeniata* in 2 lots, one in an aquarium painted yellow on the bottom and sides, the other in a corresponding aquarium painted black. At transformation, Sacerov's results were confirmed, i.e., those reared on the yellow background were "yellower than the mother, and the spots larger and fused together," those on the black being "darker than the mother and the spots smaller and more numerous." The author, however, has no doubt that these 2 types will in time assume the same character.—*A. M. Banta.*

1684. BOWMAN, H. H. M. **Deterioration in some horticultural varieties through deficient artificial selection.** Jour. Heredity **11**: 380–383. 1920.—In the spring of 1919 seeds were purchased of named varieties of China aster, *Callistephus chinensis*, *Zinnia elegans*, African marigold (*Tagetes erecta*), *Matthiola incana*, and the corn-flower (*Centaurea cyanus*). These varieties (purchased from the same firm) had been grown in the 2 preceding years under similar conditions. In all cases notable variations were observed which in most cases are considered as deteriorations from the standard. The author believes that there has been much mixing with dominant inferior strains, which has naturally affected the germ plasm of the standard varieties, and that therefore these variations are due to genetic rather than environmental causes.—*C. E. Myers.*

1685. BRIDGES, CALVIN B. **Triploid intersexes in Drosophila melanogaster.** Science **54**: 252–254. 1921.—A culture of flies produced 96 females, 9 males, and about 80 individuals "intermediate between males and females." Distribution of the genetic characters brown, plexus, and speck, in this culture was so aberrant as to warrant the hypothesis that the chromosomes involved might sometimes be present in a triploid instead of the usual diploid number. This was confirmed by cytological evidence. The intersexes, which were all sterile, each had 3 second chromosomes, 3 third chromosomes, 2 X-chromosomes, 2 or 3 fourth chromosomes, and either with or without a Y-chromosome. The author, describing the appearance and genetic behavior of various flies of this aberrant group, says: "A significant new conclusion proved by the intersexes is that sex in *D. melanogaster* is determined by a balance between the genes contained in the X-chromosome and those contained in the autosomes. . . . . The ratio of *2X : 2 sets autosomes*, or *3X : 3 sets autosomes* (or *1X : 1 set autosomes?*) produces a female, while *1X : 2 sets autosomes* produces a male. An intermediate ratio, *2X : 3 sets autosomes*, produces an intermediate condition,—the intersex." After discussing the possibilities already found, the author comments on the varying influence of autosomes, and speculates on the effect of additional chromosome ratios.—*John S. Dexter.*

1686. BROILI, J. **Der Pollenstab.** [The pollen staff.] Deutsch. Landw. Presse **1920**: 447–448. *1 fig.* 1920.—The author describes a stick to be inserted into the ground to facilitate collection of pollen in vials. It is especially convenient in potato work. [From anonymous review in Zeitschr. Pflanzenzücht. **8**: 45–46. 1921.]—*J. P. Kelly.*

1687. BROOKS, F. T. **The inheritance of disease-resistance in plants.** Trans. British Mycol. Soc. **7**: 71–78. 1921.—The hitherto unpublished results of Armstrong's work with yellow rust of wheat (*Puccinia glumarum* form. *tritici*), are outlined. All F_1 plants of Wilhelmina × American Club were moderately rusted. The F_2 generation, sown partly in autumn and partly in spring, contained 1560 plants, of which 381 were badly rusted, 832 moder-

ately so, and 347 were rust-free,—approximately a 1:2:1 ratio. The genotypes of some of the F_2 plants were tested by growing the F_3 plants. Taking the whole F_2 crop after adjustment with the F_3 results, the following composition was indicated: 392 homozygous susceptible, 797 heterozygous susceptible, and 371 homozygous immune. Different behavior in different years is attributed to the operation of environmental factors.—Armstrong's preliminary studies with wheat indicate that resistance to mildew (*Erysiphe graminis*) behaves as a Mendelian dominant.—*A. N. Wilcox.*

1688. Brumpt, E. **Recherches sur le déterminisme des sexes et de l'évolution des Anguillules parasites (Strongyloides). [Studies on the determinism of sex and the evolution of the parasitic Anguillula (Strongyloides).]** Compt. Rend. Soc. Biol. 85: 149–152. 1921.—*Strongyloides papillosus*, parasitic in the small intestine of sheep, exists in a parthenogenetic parasitic generation and a free-living bisexual generation. Eggs laid by the parasitic form pass with the feces and produce rhabditic larvae, of which some develop directly into strongyloid larvae ready to infect a new host, some into males and females. The bisexual generation is mostly sterile because of rarity of males. Cultures usually contain 1 male to 1000–2000 females, rarely a much higher proportion. The proportion of directly developing strongyloid larvae and of adult males varies; in many cultures development is exclusively direct, most others show 95–98 per cent direct development, and a few show as high as 90 per cent indirect development (males or females).—From the feces of young infected rabbits there were recovered 237 males, 409 females, 1236 direct larvae, and later many larvae of indirect cycle coming from fertilized females. The higher proportion of indirect development and of males in rabbits than in sheep is attributed to the physico-chemical character of the intestinal mucus. A strongyloid infectious larva from a parthenogenetic parent will, if reared in a rabbit, yield a parthenogenetic animal whose eggs produce 1000–2000 times as many males as if the strongyloid larva had been reared in a sheep.—*A. Franklin Shull.*

1689. Castle, W. E. **An improved method of estimating the number of genetic factors concerned in cases of blending inheritance.** Science 54: 223. 1921.—A modified formula for estimating the number of genetic factors (n) concerned in cases of blending inheritance (see following entry) suggested by Wright is $n = \frac{D^2}{8\sigma_2^2 - \sigma_1^2}$, in which D is the difference between the means of the parental races, σ_1 the standard deviation of the F_1, and σ_2 the standard deviation of F_2.—*D. F. Jones.*

1690. Castle, W. E. **On a method of estimating the number of genetic factors concerned in cases of blending inheritance.** Science 54: 93–96. 1921.—The amount of variability of F_2 over F_1, shown by the standard deviation, divided by the difference of the 2 parental means is taken as a comparative measure of the number of factor differences concerned in cases of blending inheritance. Applied to data for seed weight of maize, it gives from 11 to 19 as the number of genetic factors involved. In a cross of Polish × Himalayan rabbits 50 or more factors were calculated as governing body size. Serious limitations as to the applicability of this method are recognized, viz., it applies perfectly only to cases in which the parents are genetically pure, and does not allow for unequal effect of different factors.—*D. F. Jones.*

1691. Castle, W. E., and W. L. Wachter. **Genetics of Hereford cattle.** Jour. Heredity 12: 37–39. *Fig. 27–28.* 1921.—This is a criticism of a paper by Frances Pitt (see Bot. Absts. 5, Entry 1605), in which an attempt was made to account for variations in the coat pattern and intensity of color of Hereford cattle on the basis of 5 Mendelian factors. The present authors hold that the data are insufficient to demonstrate the unit nature of these factors.—*Sewall Wright.*

1692. Clausen, R. E., and T. H. Goodspeed. **Inheritance in Nicotiana Tabacum. II. On the existence of genetically distinct red-flowering varieties.** Amer. Nat. 55: 328–334. 1921.—In studies of inheritance in *Nicotiana Tabacum* the following formulae were suggested for 4 flower colors: *WW RR PP*, carmine; *WW RR pp*, light pink; *WW rr pp*, red; and *ww*

RR pp, white. *WW RR PP* represents the basic type, carmine in color; *w*, the difference from it which gives white, irrespective of which members of the pair occupy the *R* or *P* loci; *p*, that which gives pink; and *r*, that which changes pink to red.—In reciprocal crosses between Cuba (white) and *macrophylla* (red), 150 F_1 plants were pink-flowered. The F_2 plants gave totals of 113 pink, 44 red, and 42 white, the expected numbers, based on a 9: 3: 4 ratio, being 112 : 37: 50. Another form, *purpurea*, exhibits a flower color somewhat darker and more intense than *macrophylla*. In order to demonstrate the difference in behavior between these 2 reds, a number of parallel crosses were made between them and other *Tabacum* varieties. When *macrophylla* was crossed with *angustifolia* (light pink), with Cavala (pinkish), and with Cuba (white), all the F_1 plants were pink-flowered. When *purpurea* was crossed with these 3 forms, the F_1 plants were carmine-flowered. Further crosses of Cuba and *purpurea* gave F_2 totals of 190 carmine, 48 pink, 107 white, further substantiating the difference between *macrophylla* and *purpurea*. This also supports the belief that the dominant carmine described by Allard was genetically different from the recessive red previously described by the authors.—*A. N. Wilcox.*

1693. COLLINS, J. L. **The new craft of making plants to order.** Gard. Mag. 33: 372–374. *2 fig.* 1921.—This is a rather non-technical review of the method of producing new plants by applying genetic principles.—*H. E. Brewbaker.*

1694. COLLINS, J. L. **The new craft of making plants to order. II. Increased crop through hybrid seed.** Gard. Mag. 34: 40–41. *3 fig.* 1921.—Commercial possibilities are pointed out. —*H. E. Brewbaker.*

1695. COVILLE, FREDERICK V. **A new hybrid—the Katherine blueberry.** Jour. Heredity 11: *Frontispiece.* 1920.—This is the best of 3,000 hybrids from crossing 2 selected strains of highbush blueberry. Over 97 per cent of the berries range between ½ and ¾ inch in diameter; and they have a delicious flavor, firm texture, and small seeds. This variety will soon be on the market.—*Merle C. Coulter.*

1696. DANIEL, LUCIEN. **Recherches sur la greffe des Solanum. [Studies on Solanum grafts.]** Compt. Rend. Acad. Sci. Paris 171: 1074–1076. 1920.—Potato grafts of the variety Fluke placed upon tomato and egg-plant produced aerial tubers. The aerial tubers from the potato-tomato graft produced plants which were all alike and resembled the variety Fluke. The aerial tubers from the potato-egg-plant graft produced plants which behaved as intermediates, and matured much later than the potato-tomato grafts. Three plants produced both aerial and subterranean tubers, as many of the latter being obtained as from normal plants. The plants producing both subterranean and aerial tubers were not attacked by *Phytophtora infestans*. Several grafts of egg-plant upon tomato produced fruits of tomato shape, but with the color of the egg-plant. Other grafts showed no change.—*H. K. Hayes.*

1697. DAVIS, H. P. **Were the black-and-white Holsteins originally red-and white?** Jour. Heredity 11: 155. 1920.—The author reports the occurrence of a Holstein calf with red-and-white markings, which leads him to believe that the ancestors of Holstein-Friesians were probably red-and-white. . He desires information concerning this problem and contact with anyone having a red-and-white heifer.—*E. Roberts.*

1698. DETLEFSEN, J. A. **A herd of albino cattle.** Jour. Heredity 11: 378–379. *Fig. 26–27.* 1920.—The author describes a herd of pink-eyed white cattle at Mora, Minnesota. The owners' statements as to the mode of origin and later breeding do not harmonize well with any simple explanation of the mode of inheritance of albinism, and agree best with the hypothesis that it is recessive. The original albinos are said to have come from mating a Holstein bull to grade Holstein cows.—*Sewall Wright.*

1699. DUNN, L. C. **Unit character variation in rodents.** Jour. Mammalogy 2: 125–140. 1921.—Comparison is made between color variations studied experimentally in rodents

and those reported as occurring in the wild, or represented by specimens in various museums. White spotting, albinism, yellow, black, and the pink-eyed colored variation are found to be rather widely distributed mutations from the agouti color, typical of wild rodents. Community of genes, which seems probable in many cases, has been proved by similarity in linkage relations in the case of the pink-eyed colored variation and albinism in rats and mice.—*Sewall Wright.*

1700. Euler, K. **Ein bemerkenswerter Fall von Knollenfarbabänderung der Kartoffel.** [**A remarkable case of change of color in potato tubers.**] Deutsch. Landw. Presse **1919**: 161–162. 1919.—This is an account of a single plant (grown from a white tuber) which gave 10 red tubers and 1 tuber red at stem end and white at crown end. The tuber producing this plant was the only one from a plant whose aerial parts were killed by cold, and the variation is therefore supposed to have been induced by frost. [From anonymous review in Zeitschr. Pflanzenzücht. 7: 35. 1919.]—*J. P. Kelly.*

1701. Eyster, Lewis A. **Heritable characters of maize. VII. Male sterile.** Jour. Heredity **12**: 138–141. *Fig. 21–23.* 1921.—A description and a photograph of the male-sterile character in maize, together with some genetic data on its inheritance, are presented. Defective anthers in which no pollen is produced are borne on an otherwise normal plant. Data from 2 heterozygous, self-pollinated ears and 3 back-crosses show that male-sterile is inherited as a simple Mendelian recessive to the normal type of tassel.—*E. W. Lindstrom.*

1702. Eyster, William H. **Heritable characters of maize. VI. Zigzag culms.** Jour. Heredity **11**: 349–357. *Fig. 8–16.* 1920.—The zigzag culm described was first noted by R. A. Emerson in F_4 cultures of a cross between Tom Thumb and a Missouri dent corn. Emerson found that plants selfed bred true for this character and, when crossed with normal plants, produced apparently normal F_1 plants. The zigzag culm appears about the time of tassel emergence, the 1st indication being an apparent flattening and broadening of the culm in the ear-shoot region caused by the leaf sheaths pulling away from the culm. Extracted recessives from crosses vary considerably in the expression of this character. F_2 progenies of outcrosses with normal plants in segregating deviate but slightly from the 15 : 1 ratio expected when 2 duplicate factors are involved in the expression of a character. Results of back-crosses of F_1 plants with the zigzag parental type indicate that zigzag culm is expressed only when at least 2 factors are recessive.—*H. M. Steece.*

1703. Freckmann, W. **Ein Beitrag zur Frage der Futterpflanzenzüchtung.** [**A contribution to the question of forage-plant breeding.**] Mitteil. Deutsch. Landw. Ges. **36**: 550–553. *4 fig.* 1921.—A brief account is given of some work done at Moorland experiment station, Neuhammerstein, with *Poa pratensis*, timothy, and tall meadow oat grass. The author considers that of the 3 methods used at the station, namely, general improvement, group selection, and individual selection, group selection gives the most rapid results for practical work. Pasture and meadow forms of *Poa pratensis* have been isolated, and some variations in the structure of the panicle are described. A table of analyses is given to show that strains of timothy having higher protein content can be developed. A tall, sturdy, late-maturing oat-grass, obtained by selection, is illustrated.—*A. J. Pieters.*

1704. Gassner, G. **Untersuchungen über die Sortenempfänglichkeit von Getreidepflanzen gegen Rostpilze.** [**Studies on the susceptibility of cereal varieties to rust.**] Zentralbl. Bakt. II Abt. **49**: 7–9, 185–243. 1919.—In studying the reaction of various cereals to *Puccinia graminis*, *P. triticina*, *P. coronifera*, and *P. Maydis*, 8 grades of rust attack were distinguished; stages of development of the hosts from young seedlings to mature plants were likewise recognized. Observations were made in Uruguay (1907–10) on pure lines of small grains obtained from Germany and in South America. In both barley and wheat the stage of development of the host is particularly important in its reaction to *P. graminis*. To *P. graminis* barley varieties showed no true resistance; a German variety of oats, Beseler II, was very resistant, while a Uruguay variety proved susceptible; other European oats, among them Svalöf's

Ligowa and Gold Rain, proved highly resistant. Uruguay oat varieties were somewhat resistant to *P. coronifera*, European varieties being susceptible. At the same stage of development spring wheats proved more susceptible to *P. triticina* than winter wheats. At the same stage of development maize varieties differed in susceptibility to *P. Maydis*, early-maturing varieties being more severely attacked than later maturing ones. The author reviews various theories regarding environmental and hereditary factors which cause differences of reaction of varieties to parasitic fungi.—*H. K. Hayes.*

1705. [Gates, R. R.] [Rev. of: Sturtevant, A. H. **The North American species of Drosophila.** Carnegie Inst. Washington. Publ. 301. *iv+150 p., 3 pl.* 1921.] Nature **107:** 743. 1921.

1706. Goldschmidt, Richard. **Erblichkeitsstudien an Schmetterlingen. III. Der Melanismus der Nonne, Lymantria monacha L. [Genetical studies on butterflies. III. The melanism of the nun, Lymantria monacha L.]** Zeitschr. Indukt. Abstamm.- u. Vererb. **25:** 89–163. *Pl. 6–8, 2 fig.* 1921.—Melanism in the nun moth presents in each sex an unbroken series of variations from white to black, and depends upon the recombination of 3 pairs of factors, 1 sex-linked. Males are darker than females. Polymeric and sex-linked factors cooperate, as in fertility in fowls (Pearl) and the silky fowl × brown leghorn (Bateson, Punnett).—All 3 factors are dominant: *A*, responsible for faint pigmentation in near-white individuals, but not yet fully analysed; *B*, spreading an increased pigmentation from the middle band of the wing; *C*, a sex-linked darkening factor for which the female is always heterozygous, much more intense in action than *B*, which it supplements.—Six forms of ♀ and 9 of ♂ result from *B* and (*CX*), all visibly distinct except a few male combinations. Of the theoretical 54 cross-combinations, 28 were realized, in some cases by several matings. A detailed history of successive generations in 7 different stocks is given.—The unexpected appearance in 4 cultures of individuals carrying the sex-linked factor (*CX*), although belonging to strains free from it, is interpreted as mutation. Non-disjunction of *X*-chromosome in the homozygous male explains 3 anomalous families, e.g., a fully melanic female, *BB* (*CX*), × white ♂, *bb*(*cX*) (*cX*), should give by "criss-cross" inheritance only white ♀♀ and black ♂♂, but 1 brood contained, besides 55 typical individuals, 1 dark ♀, [*Bb* (*CX*)], and 1 banded ♂, [*Bb*(*cX*) (*cX*)]. These 2 came from gametes *b*, and *b*(*cX*) (*cX*) of the father, meeting *B* (*CX*) of the mother.—Seiler reports that 28 chromosomes, including 1 remarkably large, occur in both the 1st and 2nd spermatocytic mitoses. All sperms contain this number. In the metaphase of the 1st maturation spindle of the egg, however, 31 chromosomes occur, of which 4 fuse during the anaphase. Hence the equatorial plate of the 2nd maturation spindle has only 28. But an embryo shows 62, not 56. Peculiarities of sex-linked inheritance are expected from the occurrence of a compound sex chromosome.—Melanic individuals were rare from 1785 till about 50 years ago, but now have largely replaced the type, especially near industrial centers. The theoretical statistical consequences of the appearance, within the original white population, of a certain proportion of mutants for one or both of the factors, followed by free intercrossing, are worked out, no selection value being attached to the melanic character. In general, after a single period of mutation, dark individuals tend to become more abundant than light except that, if the sex-linked (*CX*) is involved, the proportion remains constant in the female. Repeated mutations of 10 per cent annually would be necessary to insure supremacy of the dark form in 40 years. This percentage of mutation being improbable, selection-value is ascribed to the melanic form.—Numerous measurements show that dark individuals are not necessarily larger (and stronger) than the type, but artificial selection of dark individuals has resulted in a marked increase in size. Disturbed natural conditions around industrial districts may greatly increase a selection value elsewhere slight. Possibly larvae of the melanic form better withstand the ill effects of feeding upon leaves of trees covered with chemical deposits. That homozygous white males fall below expected numbers in the cultures may indicate low viability.—Melanism in the adult has no effect upon the caterpillar. Melanism in the larva is due to another independent dominant factor.—*John H. Gerould.*

1707. Goldschmidt, Richard. **Kleine Beobachtungen und Ideen zur Zellenlehre. II. Die Spermatogenese eines parthenogenetischen Frosches nebst Bemerkungen zur Frage welches Geschlecht bei den Amphibien das Heterozygotische ist. [Minor observations and ideas in cytology. II. The spermatogenesis of a parthenogenetic frog with comments on the question which is the heterozygous sex in amphibia.]** Arch. Zellf. 15: 283–290. 1920.—The author reports the diploid number of 26 chromosomes in the testis of an adult frog which J. Loeb produced by artificial parthenogenesis. He discusses possible explanations of this occurrence and suggests that the female is heterozygous for a sex chromosome.—*C. L. Parmenter.*

1708. Goldschmidt, Richard. **Zur quantitativen Auffassung multipler Allelomorphe. [Quantitative conception of multiple allelomorphs.]** Zeitschr. Indukt. Abstamm.- u. Vererb. 26: 285–287. 1 *fig.* 1921.—Muller has shown that the multiple allelomorphs for eye color in *Drosophila* can not be fitted to an ordinary probability curve, and contends that they are not quantitative variations of a single gene. The quantitative conception of multiple allelomorphs demands not that they fit a single probability curve, but several such curves overlapping each other. Muller's 2nd argument, based on the theory that the factors located on the X-chromosome produce the same effect in both sexes, is also held invalid. The effect of any 1 factor is a result of dominance rather than of quantity.—*P. C. Mangelsdorf.*

1709. Goodrich, E. W. **Some problems in evolution.** Sci. Monthly 13: 316–321. 1921.—This address emphasizes the fundamental problem of how genetic factors of an organism originate and change. Guyer's anti-lens tests suggest that environmental influences give rise to heritable mutations. The share of mind in evolution is discussed, with the statement that mind and body evolved together.—*L. Pace.*

1710. Gowen, John W. **Inheritance in crosses of dairy and beef breeds of cattle. II. On the transmission of milk yield to the first generation.** Jour. Heredity 11: 300–316. *Fig. 5–15.* 1920.—Results of crosses among Aberdeen Angus, Holstein-Friesian, Jersey, Guernsey, and Ayrshires in relation to milk yield are discussed. One cross-bred from a Holstein-Friesian cow and a Jersey bull resembled closely the expected potential milk production of the Jersey. This is probably due to segregation of factors for low milk production rather than dominance of low production. From the other cases it appears that high milk yield is partially dominant to low milk yield, since cross-breds resemble high parents more closely in this respect than they do low parents. Other investigations on this subject are briefly reviewed.—*E. Roberts.*

1711. Haecker, V. **Weitere phänogenetische Untersuchungen an Farbenrassen. [Further phenogenetical studies of color races.]** Zeitschr. Indukt. Abstamm.- u. Vererb. 25: 177–184. *1 pl.* 1921.—The dark races of Axolotl studied by Haecker were heterozygous. The author suggests that the varying proportions of the 2 types of pigment cells are probably due to "demoralization" of the conditions of equilibrium between the corial and epidermal cells resulting from hybridization. Reviewing the work of F. Dyckerhoff, Standfuss, Zurich, and Huemer on melanism of butterflies, the author concludes that melanism is clearly hereditary and readily influenced. Citing the work of Ladebech, Gortner, Spottel, L. Jones, and K. Paul on melanism in fowls, he notes that the more highly bred fowls lack transitional types of pigment cells. Gortner's distinctions between dull yellow-black-brown melanism and bright yellow-red-brown melani-protein appear less simple than they at first seemed. Observations on distribution of birds are given to show that climatic conditions determine the expression of coloration of different types.—*M. Mann.*

1712. Harms, W. **Das Problem der Geschlechtsumstimmung und die sogenannte Verjüngung. [The problem of sex modification and so-called "rejuvenescence."]** Naturwissenschaften 11: 184–189. 1921.—Experiments on the effects of gonad transplanation, particularly those of Steinach, are not entirely corroborated by the author's researches on very young porpoises. The transplanting of ovaries into a very young male did not result in the development of the rudimentary uterus present at birth. The results were essentially those of

castration with the exception that the milk glands were abnormally developed for males. Similar experiments with the toad produced no positive results, yet some variation from normal secondary characters and sexual instincts were noted.—Dogs were used to study the results of gonad transplantation on senility. In each case placing ovaries of young dogs in bodies of old dogs caused death, although the operation itself appeared successful. One showed fresh corpus lutea, another an embryo in the uterus. The testes of a young dog were transplanted into a 17-year-old dog showing all the characters of senility. After the operation the dog lost the senile appearance, taking on the typical characteristics of a young dog. A correlated influence of the hormones of the testes with those of other secretions resulting in rejuvenation is suggested.—*J. L. Collins.*

1713. Hauptmann, Alfred. **Grundlagen, Stellung und Symptomatologie der "myotonen Dystrophie."** **[Basis, location, and symptomatology of myotonic dystrophy.]** Deutsch. Zeitschr. Nervenheilk. 63: 206–249. 1919.—Myotonic dystrophy is certainly an hereditary disease. In the great majority of cases symptoms are found in the parents of the patient. Cataract is practically always present for generations before the myotonic dystrophy appears. Probably the "Anlagen" of the other symptoms are also present, each inherited independently. Cataract is then dominant, the other symptoms recessive; sooner or later all of them appear. If, as sometimes happens, no symptoms are found in the parents, they may be considered latent. Very often brothers and sisters of one afflicted with myotonic dystrophy are weak-minded, and there are many signs of degeneration in the family history.—*B. Whiteside.*

1714. Hayes, Herbert Kendall, and Ralph John Garber. **Breeding crop plants.** *15.5 × 23.5 cm., 328 p., 66 fig.* McGraw-Hill Book Co.: New York, 1921.—This book presents the fundamental principles of crop breeding, summarizes the known facts regarding the inheritance of many important characters of the commoner crop plants, and suggests methods of breeding for each of the more important field crops. The 1st 2 chapters review the work of the pioneer plant breeders and summarize the principles of plant genetics as a basis for crop improvement. The next 3 chapters deal with the mode of reproduction in various crop plants in relation to the technique employed in breeding them, emphasizing field-plot technique and factors influencing the reliability of results of field-plot trials, and including the technique of controlled pollination in certain plants. The next 14 chapters are devoted to a consideration of classification, inheritance of various characters, methods of breeding, and results of selection and crossing of wheat, oats, rye, barley, buckwbeat, rice, cowpeas, soy beans, velvet beans, flax, tobacco, cotton, sorghum, maize, several grasses, clovers, alfalfa, potatoes, and various fruits and vegetables. A glossary of plant breeding and genetic terms and a bibliography of the more important plant breeding and plant genetics contributions are appended.—*C. B. Hutchison.*

1715. Henry, J. K. **Ribes divaricatum × Ribes Lobbii.** Canadian Field Nat. 33: 94. 1919.—George H. Knight, nurseryman of British Columbia, found on Vancouver Island a peculiar gooseberry growing among wild plants of *Ribes divaricatum* Dougl. and *R. Lobbii* Gray. The new type resembles *R. Lobbii* in many respects, in others it is quite similar to *R. divaricatum.* Descriptions are given of each species and of the supposed hybrid. That this is a hybrid can not now be decided as it has not fruited. *Ribes* hybrids are not easily produced, and natural hybrids are unknown in North America.—*A. C. Fraser.*

1716. Hochè, Léon, et René Morlot. **Evolution parthénogénétique de l'ovule dans l'atrophie de follicule à l'état de maturité. [Parthenogenetic development of the egg in a case of atrophy of the follicle.]** Compt. Rend. Soc. Biol. 83: 1152–1154. 1920.—The authors observed in the ovary of a girl 12 years old an egg the periphery of which was divided into small cells, the remainder composed of transparent granular yolk. The latter contained numerous chromatic elements in balls varying in volume and position. No evidence of a spindle was present. One of the small cells was seen in anaphase. Flemming, Henneguay, and others have reported similar cases in which segmentation of the egg seems to occur not by regular cell division but by gemmation. The authors interpret these cases as the beginnings of parthenogenetic development, but only as another phenomenon of degeneration.—*C. L. Parmenter.*

1717. Honda, H. **Spermatogenesis of aphids; the fate of the smaller secondary spermatocyte.** Biol. Bull. 40: 349–368. *4 pl.* 1921.—In *Stomaphis yanois* the diploid number of chromosomes is 10. The 1st spermatocyte division results in unequal cells. Eight chromosomes divide and are distributed equally to secondary spermatocytes, while 2 lag and then go undivided to a larger cell. The larger cell divides equally and forms 2 functional spermatozoa. The smaller secondary spermatocyte divides equally, the 2 small cells elongate, become active, and move toward sustentacular cells, but do not become attached; unable to obtain nourishment, they degenerate, their length being reduced and the cytoplasm increasing around the nucleus. In *Neothomasia populicola* and *Macrosiphum ambrosia* the smaller secondary spermatocyte divides, but spermatids do not develop.—*A. Franklin Shull.*

1718. Hovasse, R. **L'activation parthénogénétique des oeufs de grenouille rousse (Rana temporaria L.) dans les milieux hypotoniques et hypertoniques. [Parthenogenetic activation of the eggs of Rana temporaria L. in hypotonic and hypertonic solutions.]** Compt. Rend. Acad. Sci. Paris 172: 1137–1139. 1921.—The author placed unfertilized frog eggs, from the uterus, in water to allow the jelly to swell, then removed the jelly and returned the eggs to distilled or tap water (distilled water is much more effective than tap water). The eggs swell, shrink, and swell again until the 1st cleavage appears. In unfertilized eggs, from the uterus, placed in various solutions,—e.g., LiCl, NaCl, KCl, various sugars, urea,—and transferred after 2–3 hours to tap water, segmentation occurred in 6–7 hours. Removal of the jelly is favorable. Best results are secured with hypotonic salts, and with iso- or hypertonic non-electrolytes. Osmotic pressure does not offer a complete explanation, as imbibition by cell colloids is also involved.—*C. L. Parmenter.*

1719. Hutchison, C. B. **Heritable characters of maize. VII. Shrunken endosperm.** Jour. Heredity 12: 76–83. *Fig. 20–24.* 1921.—Plants from kernels with shrunken endosperm, occurring in maize from the Ponka Indians in Nebraska, bred true for this character, which was shown to be inherited as a simple recessive to the normal endosperm and is designated by the genetic symbol *sh*. F_2 of crosses between normal and *sh* deviated but slightly from the 3:1 relation and in back-crosses but slightly from 1: 1, indicating that shrunken endosperm is differentiated from the normal by the single factor pair *Sh sh*. Selfing an F_1 plant of the cross between a homozygous red-aleurone shrunken plant of the genetic constitution *C C sh sh* with a colorless-aleurone non-shrunken plant, *cc Sh Sh*, produced an ear with both shrunken and non-shrunken as well as colored and colorless kernels, but with all shrunken kernels colored. This indicated that the *Sh sh* and *Cc* factor pairs are linked.—Progenies from back-crosses between F_1 plants and the double recessive suggest that the factor pair *Sh sh* belongs to the same linkage group as *Cc* and *Wx wx*. Several F_1 plants of the cross non-shrunken waxy (*Sh Sh wx wx*) × shrunken starchy (*sh sh Wx Wx*) back-crossed to double recessive shrunken waxy plants produced kernels as follows: Non-shrunken starchy 229, non-shrunken waxy 813, shrunken starchy 833, shrunken waxy 230.—The very close approximation of the *Sh sh—Cc* linkage relation by that of *Sh sh—Ii* suggests that *Cc* and *Ii* are very closely linked, or are on opposite sides of *Sh sh* and approximately equally distant, or are allelolorphic. *H. M. Steece.*

1720. Kanda, M. **Field and laboratory studies of Verbena.** Bot. Gaz. 69: 54–71. *4 pl., 26 fig.* 1920.—Several intermediate types were found between the 3 established species, *V. angustifolia*, *V. stricta*, and *V. hastata*. Cytological studies on these 3 and on an intermediate between the last 2 showed 4 haploid chromosomes in *V. angustifolia*, 6 in the others. Some of the developmental characters of the intermediate types resemble *V. stricta*, some *V. hastata*, and some are intermediate. Chromosome behavior is normal and similar in all three.—*Merle C. Coulter.*

1721. Krieg, Hans. **Über die Bildung von Streifenzeichnungen bei Säugetieren. [On the formation of the striped coat pattern in mammals.]** Anat. Anzeiger 54: 33–40. *6 fig.* 1921. —Three types of striping of mammalian coat patterns are recognized: (1) Zebra-tiger-hyena pattern with vertical stripes over the body, circular stripes at the extremities, and stripes

forming a pointed arch in the regions where body and extremities meet; (2) longitudinal stripes presumably a primitive pattern, as found in young swine and tapirs; and (3) "streaming" type, found only in domestic animals (cattle and dogs principally), in which vertical striping extends over back and rump, and circular striping fails to develop on the extremities. Each of these types appears to be hereditary, although asymmetrical and fortuitous patterns may arise, due to developmental dynamics. The author's researches in perissodactyls and their hybrids lead him to believe that the striping pattern and its variations are correlated with accompanying or resultant phenomena of growth processes. He observed that the 1st type of striping is closely related to the folds in the skin of young mammals, especially of newly born rabbits. He believes this folding due to specific pulling and pressure relations on the skin. On the basis of data submitted by Schumacher on a foetal wild hare, the author establishes a relation between the median stripe of the foetal hare and the 2nd type of striping as represented in the dorsal stripe of *Equidae*, and regards the flecking such as occurs in the civet cat and *Viverridae* in general as a transitional phase between the 2 types. Schultz's experimental induction of black melanin formation in albino rabbits by means of cold applied to the high folds of the skin, is noted, but the author thinks that the stripes in cases he has studied follow the infolds of the skin. It is suggested that the patterns are due to "biological interference" at a critical developmental stage, and are related to the arrangement of pigment-forming cells in rabbits of English pattern, whose spotting conforms in a broken way to type 1.—*Edward N. Wentworth.*

1722. KUIPER, K. **Color inheritance in cattle.** Jour. Heredity 12: 102–109. *Fig. 1–8.* 1921.—The author reports a study of inheritance of color in Dutch Belted cattle. These cattle are usually black and belted, but self-black, self-red, and red belted are occasionally produced. Also, there are wide variations in the belting pattern. From matings of belted bulls and belted cows 50 calves were produced, 7 of which were self-colored (6 blacks, 1 red) and 43 belted. A belted bull was mated to more than 60 piebald heifers, 6 of them red and white, but most of them black and white. Of 55 calves produced, 27 were belted, 24 or 25 self-colored, and 3 or 4 pied. The self-colored were in general coal-black, but some showed a small white spot on belly, forehead, or tail-end. In only 1 case was it doubtful whether the animal was self-colored or pied. Crossing a piebald bull and belted cows gave 18 belted, 2 self-colored, and 1 piebald. Differences between the 2 ratios can be explained on the basis of different genetic constitution of parents in the 2 crosses. Irregularity of color patterns in the cross-breds is discussed. Taking B = belt, b absence of belt; S = self-colored; and s = piebald pattern, the ratios obtained could be accounted for by a repulsion between B and S giving 1 : 7 : 7 : 1. If the belted bull were of the formula $BbSs$ he would form gametes in the following proportion: 1 BS : 7 Bs : 7 bS : 1 bs. Mating such a bull to pied cows ($bbss$) the result would be 1 $BbSs$: 7 $Bbss$: 7 $bbSs$: 1 $bbss$, or 8 belted, 7 self-colored, and 1 pied, which agrees closely with observed results. Other types of mating are discussed in the light of this explanation.—*E. Roberts.*

1723. LAKON, GEORG. **Die Weissrandpanaschierung von Acer negundo L. [White-margin variegation of Acer negundo.]** Zeitschr. Indukt. Abstamm.- u. Vererb. 26: 271–284. *14 fig.* 1921.—The white-edged leaves of a tree of *Acer negundo* are shown to be due to a periclinal chimera constitution of the chlorophyll-containing cells, a phenomenon similar to that in *Pelargonium*. Some stems and branches show the variegation as sectorial chimeras. The whole plant is considered a "highly complicated, mixed chimera," both periclinal and sectorial in nature. Inheritance of this variegation is not given.—*E. W. Lindstrom.*

1724. LAUGHLIN, HARRY H. **Dice-casting and pedigree selection. Experiments which picture mathematically close analogies between dice-casting and certain breeding phenomena.** Genetics 6: 384–398. *3 fig.* 1921.—By suitable casting of dice, it is possible to picture mathematically various phenomena of inheritance, such as filial regression, the rating of pure lines, the effect of selection within pure lines, and the effect of selection based on the somatic character. Six dice, lettered a to f, are used. The faces of die a are marked 1–6; of die b, 2–7; of die c, 3–8; and so on to die f, which is lettered 6–11. Each die represents a definite geno-

type, and each face a possible phenotype resulting therefrom. Die *a* may produce 5 phenotypes (2, 3, 4, 5 and 6) similar to certain phenotypes produced by die *b*, representative of a 2nd genotype. Die *a* may also produce 4 phenotypes (3, 4, 5 and 6) similar to certain phenotypes produced by die *c*; 3 similar to phenotypes produced by die *d*; 2 similar to phenotypes produced by die *e*; and 1 similar to a certain phenotype produced by die *f*. The records of actual castings so designed as to produce results comparable to filial regression, rating of pure lines, pure-line selection, and somatic selection are presented in 5 tables.—*Edward N. Wentworth.*

1725. LA VAULX, R. DE. **L'intersexualité chez un Crustacé Cladocère: Daphne atkinsoni Baird. [Intersexuality in a cladoceran, Daphnia atkinsoni.]** Compt. Rend. Acad. Sci. Paris 169: 97–99. 1919.—The author thinks improper nutrition one of the causes of the appearance of intersexes, of which 135 were obtained. (In an earlier paper he attributed intersexes to unfavorable nutrition during a sexual cycle.) Intersexuality is inherited, but in most irregular fashion. One side of an animal is frequently more modified than the other, but every part capable of sexual modification may be intermediate in its sexual character. Gonads are usually functional ovaries, but rarely may be part ovary and part testis and produce both eggs and sperm. The writer abandons the term gynandromorph formerly applied to his abnormally sexed *Cladocera* and uses the term intersex, although objecting to the reviewer's distinction between the terms gynandromorph and sex intergrade (or intersex).—*A. M. Banta.*

1726. LEITCH, I. **A study of the segregation of a quantitative character in a cross between a pure line of beans and a mutant from it.** Jour. Genetics 11: 183–204. *4 fig.* 1921.—The author, continuing Johannsen's work with brown Princess beans crossed with a long-seeded, evidently homozygous, mutant from the strain, secured F_2 plants showing a transgressive distribution in 1 direction. Of these he planted 4 types, 1 representing each original parent, 1 intermediate, and 1 the limit of transgressive variation. The original mutant type, the *M* type, bred true, as did those of the intermediate and of the transgressive variation type, the *X* type. The original pure line type, the *E* type, showed segregation according to simple 3:1 ratio. The results, 38 of *M* type and 112 each of *E* and *X* types, were in general confirmed by further work. The simplest explanation is that a factor has been modified in the original pure line to give the mutation. The theory of loss of a factor or factors obviously can not be applied.—*L. R. Waldron.*

1727. LENZ, F. **Über geschlechtsgebundene Erbanlagen für Augenfarbe. [Sex-linked factors for eye color.]** Arch. Rassen- u. Gesellschaftsbiol. 13: 298–300. 1921.—Lundborg has gathered statistics showing that in Sweden 5.2 ± 13 per cent males and 11.2 ± 1.9 per cent females have brown eyes, in Finland, 6.3 per cent males and 11.3 per cent females. The female rate being double the male rate indicates that the factor for brown eyes may lie in the sex chromosome, which is double in females and single in males, the egg having double the chance of getting the brown-bearing chromosome from the sperm. As the proportion of brown increases in the population the female percentage will not be double the male, because the chance that the brown-eyed female is duplex brown is increased and therefore the potency of certain of the brown-bearing sperm is masked by the brown chromosome already in the egg.—This law of sex-linking of brown eye color can not be generalized. It does not apply to data from middle Europe or America. Perhaps it is a property of the Mongoloid race.—*C. B. Davenport.*

1728. LEVINE, C. O. **The water buffalo—A tropical source of butter fat.** Jour. Heredity 11: 51–64. *9 fig.* 1920.—The author describes the water buffalo of China and presents data on its reproduction, diseases, and uses as a draft and dairy animal. Analyses of the milk showed an average of 12.5 per cent fat, 3 times that of dairy cows. The quantity of milk produced is less, but the amount of butter fat compares favorably with that produced by good cows. The author believes that rapid improvement can be made by selection, and that immunity to tick fever and tuberculosis in addition to its dairy qualities will make the buffalo the leading dairy animal of South China. He comments on its possible usefulness in the U. S. A.—*Sewall Wright.*

1729. Lippincott, W. A. **Further data on the inheritance of blue in poultry.** Amer. Nat. 55: 289–327. *3 pl.* 1921.—The author's summary is as follows: (1) It has been shown that the development of black pigment in the blue-splashed, blue and black races of the Andalusian and Orpington breeds, and of black Langshans, depends upon the action of a dominant hereditary factor P, for which they are normally homozygous. (2) The allelomorph of P is p. Individuals homozygous for p are white, as in white Wyandotte and white Plymouth Rock breeds. (3) The extension of black pigment to all feathers of the body, resulting, if no pattern factors are present, in self-colored individuals, depends upon a dominant factor E. This factor has been found in the Andalusian, Orpington, white Plymouth Rock, white Wyandotte and black Langshan breeds. Some evidence is presented which indicates its presence in white Leghorns. (4) The blue appearance of blue and blue-splashed Andalusians and Orpingtons is due to the arrangement and restriction of black pigment, the result of a dominant factor R. This factor has also been found in individuals of the white Wyandotte and white Leghorn breeds, though its presence is probably not usual in these breeds. (5) No individuals of the Andalusian, Orpington, white Plymouth Rock, white Wyandotte, or black Langshan breeds have been found which did not carry R, E, or both. (6) The mutual relations of R and E are such that they have never been found together in the same gamete. This indicates that they are allelomorphic, i.e., occupy identical loci on homologous chromosomes, or, each is so closely linked to the recessive allelomorph of the other, (Re) and (rE), that crossing-over rarely, if ever, occurs. (7) No evidence of crossing-over between R and E has been found and the tentative conclusion must be in accord with that previously held, that R and E are allelomorphs. (8) Both R and E are independent of P in their hereditary behavior, though dependent upon its presence for their manifestation. (9) The cooperative influence of the ovary is necessary for a full expression of R in the regions of the neck, back, and saddle. (10) On the basis of the evidence presented in the body of this paper the genetic formulae of the breeds and varieties employed, with respect to the factors under observation, are usually as follows: Blue-splashed Andalusians and Orpingtons $PP(Re)\ (Re)$; blue Andalusians and Orpingtons $PP(Re)\ (rE)$; black Andalusians, Orpingtons, and Langshans $PP(rE)\ (rE)$; and white Plymouth Rocks and Wyandottes $pp(rE)\ (rE)$. (11) The possibility of the occurrence of factors which duplicate the somatic effects of R and E is pointed out, and the relation of this possibility to the production of constant-breeding blues briefly discussed.—*H. G. May.*

1730. Lotsy, J. P. **Grondbeginselen van oordeelkundig fokken en telen.** [**Principles of breeding.**] Mededeel. Ver. Bevord. Wetenschapp. Teelt 13: *47 p.* 1921.—This is a general treatise on breeding animals and plants.—*J. C. Th. Uphof.*

1731. Love, H. H., and W. T. Craig. **Fertile wheat-rye hybrids.** Jour. Heredity 10: 195-207. *11 fig. and frontispiece.* 1919.—From a cross of Dawson Golden Chaff wheat (*Triticum vulgare*) ♀ and common rye (*Secale cereale*) ♂ 1 F_1 plant was obtained, the hybrid nature of which was indicated by a few tip awns, brown glumes intermediate in size but keeled—more as in rye—and ciliate, and slightly pubescent peduncle. One seed was produced from which an F_2 plant was grown. This generation showed in many ways its rye parentage, and again only 1 viable seed was produced. The F_3 plant resulting was more like wheat than the earlier generations, showing hybrid characters to a limited extent, and produced many seed. The several F_4 plants grown varied widely as to awns and color of chaff and kernel segregations being in a 3:1 ratio. The heads were wheat-like in appearance but in some respects showed their hybrid origin, as did also the plants. Some were fully fertile, others nearly sterile. Some F_4 families have been carried further, being grown in the field to test their winter hardiness.—*C. E. Leighty.*

1732. Manson. **Hereditary spastic paraplegia with ataxia and mental defect.** British Med. Jour. 2: 477. 1920.—One brother and 3 sisters each develop rather complex, but almost identical, syndromes of severe symptoms, beginning at about the 7th year. Syphilis and alcoholism are excluded. Both parents are alive and well, but the paternal grandfather was an invalid concerning whom there is no further information.—*C. H. Danforth.*

1733. Morgan, T. H. **The genetic and the operative evidence relating to secondary sexual characters.** Carnegie Inst. Washington Publ. 285. *108 p., 10 pl. (7 colored).* 1919.—This is a detailed account of the author's experiments in castrating hen-feathered males, (with resultant assumption of cock feathering) and of crosses between hen-feathered and cock-feathered races. Hen-feathering is dominant and segregation occurs in F_2, according to the di-hybrid scheme. A description of the complex colors of the various hybrid offspring is given. There is an extended review and discussion of the literature dealing with secondary sexual characters, especial attention being paid to endocrine cells, hermaphroditism in poultry, and theories, notably Darwin's, that attempt to account for secondary sexual characters.—*H. D. Goodale.*

1734. Payne, Fernandus, and Martha Denny. **The heredity of orange eye color in *Drosophila melanogaster.*** *Amer. Nat.* 55: 377–381. 1921.—The authors have worked out the genetics of the eye color of orange-eyed males, which have arisen in the stock called "reduced." It occurs when 2 sex-linked genes, salmon (later proved identical with garnet) and salmon-modifier, are present. These genes are not closely linked, but salmon-modifier is very close to reduced. Salmon-modifier has apparently become homozygous, though not visible, in reduced stock, and does not modify the normal red eye color except in the presence of salmon.—*John S. Dexter.*

1735. Pearl, Raymond. **On a single numerical index of the age distribution of a population.** Proc. Nation. Acad. Sci. [U. S. A.] 6: 427–431. *2 fig.* 1920.—This paper presents a formula for an arbitrary index of the age distribution of a population for use in such problems as correlation, where only a single value can be used to represent the condition in each community. The suggested index is obtained by comparing the percentage age distribution of the population of the community with the percentage age distribution of a standard population. The population given by the L_x line of Glover's United States Life Table for 1910 is the standard chosen. The formula is:

$$\phi = S\left\{\frac{\Delta^2}{P}\right\}(M - M_P)$$

where P is the percentage in a given age group in the standard population, Δ the deviation of the percentage in the corresponding age group of the population of the community from the percentage of the standard population, S the summation of these percentage squared deviations for the different age groups, and M and M_P the mean ages of the population of the community and of the standard population, respectively. As an illustration of the use and reliability of the index the values for 34 American cities are presented and discussed.—*Sylvia L. Parker.*

1736. Pézard, A. **Loi du "tout ou rien" ou de constance fonctionnelle, relative à l'action du testicule considéré comme glande endocrine. [Law of "all or nothing" or of functional constancy relative to the action of the testis considered as an endocrine gland.]** Compt. Rend. Acad. Sci. Paris **172**: 89–92. 1921.—The author presents data which indicate that a mass of testicular tissue weighing approximately 0.5 gr. implanted in the peritoneum of a castrated cock brings about the complete redevelopment of secondary sexual characters, both morphologic and psychic. A smaller mass registers no noticeable effect, and increasing the mass to as much as 42.0 gr. gives no greater effect than the 0.5 gr. mass.—*William A. Lippincott.*

1737. Pézard, A. **Temps de latence dans les expériences de transplantations testiculaire et loi du "tout ou rien." [Latent period in the experiments with testicular transplantation and law of "all or nothing."]** Compt. Rend. Acad. Sci. Paris **172**: 176–178. 1921.—The author implanted testicular tissue in cocks at the time of castration, after which there was a period of regression in the secondary sexual characters followed by their rather rapid redevelopment. The author thinks the period of regression, 2–6 weeks, represents the time necessary for the implanted tissue to acquire a weight of 0.5 gram.—*William A. Lippincott.*

1738. Phillips, J. C. **A further report on species crosses in birds.** Genetics 6: 366–383. *5 fig.* 1921.—A continuation of crosses between various species of ducks on the one hand and different species of pheasants on the other confirms the author's previous assumption that segregation of characters in the 2nd hybrid generation is more pronounced in closely related species and less pronounced in distantly related ones. The results are explained on the basis that a smaller number of character differences in the closely related species permits the small numbers of offspring observed (not more than 100 in any case) to include a larger proportion of the possible combinations than is the case with the large number of differences in widely differing species. In the latter cases only the very middle of the distribution curve has been touched. Sex-linked characters were not observed.—*H. G. May.*

1739. Pinn, A. J. **An experiment in selection.** Agric. Gaz. New South Wales 32: 731. 1921.—In a series of (bin?) tuber selections of potato seed, 2 lots selected were second-growth tubers broken from larger tubers. Yields from these 2 lots were more than 60 per cent greater than secured from ordinary selected seed. The difference is ascribed largely to the fact that second-growth tubers were immature.—*L. R. Waldron.*

1740. Pitt, Frances. **Notes on the genetic behaviour of certain characters in the polecat, ferret, and in polecat-ferret hybrids.** Jour. Genetics 11: 99–115. *2 pl., 1 fig.* 1921.—The paper deals with the genetic behavior of color and certain cranial characters in the ferret, *Martes furo* L., polecat *Mustela putorius* L., and in their hybrids. The 2 species are compared as regards color, facial markings, shape of head, cranial characters, disposition, and susceptibility to disease. F_1 hybrids show complete or very nearly complete dominance of the polecat type except in cranial characters, and "when the hybrids were bred back to the polecat, animals that were apparently pure polecats resulted." In the other back-cross polecat coloration and temperament were soon lost. Evidence is presented that erythristic (red) in varieties of polecat and ferret is a Mendelian character appearing with the loss of a "*D*" (dark-brown) factor, which "seems to be correlated with increased size. . . ." The author regards as most important "the indication of Mendelian inheritance of a structural character (type of skull), and the evidence concerning a variation due to the loss of a factor appearing and maintaining itself in nature" (the erythristic polecats).—*A. W. Bellamy.*

1741. Pomeroy, C. S. **Bud variation in Eleagnus.** Jour. Heredity 12: 227–230. *Fig. 19–20.* 1921.—The author refers to the common occurrence of variegated evergreen shrubs in Southern California, and describes 2 variegated forms of *Eleagnus pungens*, *E. pungens* var. *aurea* Servettaz and *E. pungens* var. *Frederici variegata* Servettaz, in a Riverside park. Servettaz is quoted on the difficulties of classifying species of *Eleagnus* because of extreme variation.—"There is no doubt of the bud origin of the variegated forms described and illustrated herewith nor of bud generations under the continual asexual propagation of ordinary horticultural practice."—*C. S. Crandall.*

1742. Prell, Heinrich. **Reine Kette, Genospezies und Stirps.** [**Pure chain, genospecies and stirps.**] Zeitschr. Indukt. Abstamm. u. Vererb. 26: 287–294. 1921.—The term pure chain is applied to allogamous (bisexual or cross-fertilized) organisms in the same sense in which pure line is used for autogamous organisms having the same genetical construction. A genospecies contains individuals of only 1 pure line or 1 pure chain. Stirps is used for haploid organisms as species is used for diploid organisms.—*D. F. Jones.*

1743. Rawes, A. N. **Self-fertility and self-sterility in plums.** Jour. Roy. Hort. Soc. 46: 353. 1921.—The author worked with plums in a greenhouse from which insects were excluded. Pollination was accomplished by brushing stigmas with ripe stamens. The following varieties proved self-sterile: Coe's Golden Drop, Decaisne, Grand Duke, Jefferson, Kirke's Blue, Late Orange, Late Transparent Gage, Pond's Seedling, Comte d'Althan, Transparent Gage, and Washington. The self-fertile varieties were: Dennistons Superb, Monarch and Czar; and the partially self-fertile: Early Rivers, President, Prince Engelbert, and Stint. All varieties were cross-fertile except Coe, Jefferson, President, and Late Orange; the last 2 appeared to be inter-sterile. No difference was observed in size and shape of fruit or stone due to the kind of pollen used.—*A. H. Hendrickson.*

1744. Rawitscher. [German rev. of: Saito, Kendo, und Hirosuke Naganaski. **Bemerkungen zur Kreuzung zwischen verschiedenen Mucor-Arten.** (**Notes on a cross between different species of Mucor.**) Bot. Mag. Tôkyô **29**: 1915.] Zeitschr. Bot. **13**: 646. 1921.

1745. Renner, O. [German rev. of: Lehmann, Ernst. **Zur Terminologie und Begriffsbildung in der Vererbungslehre.** [**Terminology, and formation of genetical concepts.**] Zeitschr. Indukt. Abstamm. u. Vererb. **22**: 236–260. 1920.] Zeitschr. Bot. **13**: 661–665. 1921.

1746. Saunders, E. R. **On a graded series of forms in Matthiola.** Rept. British Assoc. Bournemouth Meeting *1919–1920:* 339. *1920.*—In addition to hairy and glabrous types of *M. incana,* there is a rare intermediate type, "half-hoary." Crosses between "half-hoary" and glabrous give an intermediate hybrid. This, together with its parents and the common hairy type, forms a graded series as regards hairiness, the range of 1 grade overlapping the next. Each grade has a distinct genetic behavior, explicable on the assumption of multiple allelomorphs.—*Merle C. Coulter.*

1747. Savelli, R. **Apomissia ed ibridisazoni difficili in Nicotiana.—Nota preventiva.** [**Apogamy and difficult hybridization in Nicotiana. Warning.**] Bull. Soc. Bot. Ital. **1920**: 22–30. 1920.—The author notes the occurrence of apogamy, parthenocarpy, and phenospermy in *Nicotiana* and comments on their significance in hybridization. Parthenocarpy, accompanied by formation of some viable seeds, was observed in various forms of *N. rustica* when only a few castrated flowers were left on plants, but no instances of it were found in trials of several forms of *N. Tabacum.* In cases of easy hybridization apogamy need not be considered because development of many fertilized ovules makes conditions for it unfavorable, but when hybridization is difficult fertilization of some ovules may result in stimulating adjacent ones to develop without fertilization. Thus, seed secured from *N. rustica* pollinated with *N. Tabacum* produced both hybrid individuals and plants exhibiting purely maternal characters. In wide crosses, such as species of *Nicotiana* with *Petunia, Verbascum,* etc., any seed produced is the result of apogamy. The author disagrees with Splendore (Catalizzatori o stimolanti fecondativi e mutamenti in Nicotianae. Bull. Tec. Colt. Tab. Scafati 1–2. 1915), who attributes such cases to "stimulative fertilization." The author's evidence shows, in addition to parthenocarpy, occasional crosses in which some viable seeds were produced, but these always yielded plants having purely maternal characters. Splendore obtained from *N. Tabacum* with *Verbascum* pollen plants of 3 types, viz., intermediate, maternal, and paternal, but repeated trials of this cross by the author yielded no viable seed. The importance is emphasized of studying apogamy in cases of difficult hybridization, and it is pointed out that, although Mendel's law provides a satisfactory explanation of results of varietal crosses, very little is known of phenomena involved in hybridization of different species and genera.—*R. E. Clausen.*

1748. Schmidt, Johs. **Racial investigations. III. Experiments with Lebistes reticulatus (Peters) Regan.** Compt. Rend. Trav. Lab. Carlsberg **14**^{5}: 1–8. 1919.—The character examined is the number of rays of the dorsal fin, which varies from 5 to 8. The investigation consists of: (1) Experiments in which the mother is subjected to different temperatures during the various periods of gravidity, and which show that the number of rays in the offspring is distinctly influenced by the temperature to which the mother has been exposed; and (2) experiments in which the various mothers are subjected to the same environmental conditions, being in the same aquarium, at a constant temperature. There appeared to be a great difference (about 1 : 2) between the average number of rays in the offspring of mothers with 6 and 8 rays, respectively.—Though the number of organs is influenced by environment there are differences of an inheritable quality between the various individuals. The racial differences in fish are genotypical as well as phænotypical.—*Vilh. Ege.*

HORTICULTURE

J. H. Gourley, *Editor*
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(See also in this issue Entries 1448, 1459, 1471, 1479, 1498, 1515, 1526, 1545, 1546, 1553, 1591, 1654, 1671, 1676, 1684, 1695, 1731, 1743, 1896, 1897, 1899, 1901, 1908, 1976, 2021)

FRUITS AND GENERAL HORTICULTURE

1749. Anonymous. **Algunas de las mas antiguas y mejores variedades europeas del peral. [Some of the oldest and best European varieties of pears.]** Rev. Agric. [Mexico] 6: 204–205. *1 fig.* *1921.*—The author gives technical descriptions of the fruit of 16 varieties of pears.—*J. A. Stevenson.*

1750. Anonymous. **Tratamento das mangueiras. [Treatment of mango trees.]** Bol. Agric. [Nova Goa] 2: 12–15. *2 fig.* 1920.—Directions are given for pruning mango trees so as to secure maximum yields. The necessity of treating pruning wounds is emphasized.—*John A. Stevenson.*

1751. Balme, Juan. **Algunos datos sobre el cultivo de la piña. [Notes on pineapple culture.]** Rev. Agric. [Mexico] 6: 147–151. *5 fig.* *1921.*—The writer discusses the possibilities of pineapple culture in the region between Vera Cruz and Tampico, including a consideration of soils, climatic conditions, and varieties.—*John A. Stevenson.*

1752. Benaiges de Arís, Carmelo. **Regeneración del olivar. [Regeneration of olive groves.]** Bol. Agric. Téc. y Econ. [España] 13: 313–358. *12 fig.* 1921.—The olive's importance in Spain is pointed out, and production statistics given. Yields are low, averaging only 806 kgr. of fruit per hectare as against an average of 1500–3000 kgr. in France. This is due to many factors, including excessive interplanting of other crops; pests and diseases; and general neglect. Corrective measures are outlined.—Sooty mold (*Anthennaria oleoeophila*), which forms a black crust on the leaves, causes some injury. Copper sulphate is recommended, as well as insecticides, to control insects on the secretions of which the fungus lives. Other diseases are leaf spot (*Cicloconium oleaginum*), tuberculosis (*Bacillus oleae*), and root rots (*Armillaria mellea*, *Polyporus fulvus*, and *Dematophora necatrix*). Control measures are given.—*John A. Stevenson.*

1753. Benson, C. H. **Report of work at Sitka station.** Rept. Alaska Agric. Exp. Sta. 1919: 19–21. 1920.—In the strawberry breeding work 1064 new hybrids came into bearing, and as a result of the 1918 breeding 1723 hybrids were set out. A report on raspberries, gooseberries, and currants is given. Crosses made in 1916 between the Cuthbert raspberry and a native yellow salmonberry (*Rubus spectabilis*) resulted in 1 good hybrid, named Bensonberry, showing characteristics of both parents. Tree fruits were not satisfactory. *Armeria formosa*, *Cerastium tomentosum*, *Lychnis arkwrightii*, *Pentstemon digitalis*, and *Primula acaulis* × *elatior* are added to the list of herbaceous perennials previously recommended. Of 35 varieties of hybrid roses set out in 1917 only 5 were alive in 1919, and these were in poor condition. *Rosa rugosa* and hybrids are again recommended. Tomatoes and cucumbers were grown in the greenhouse.—*J. P. Anderson.*

1754. Bovet, Pedro A. **Sobre la estaca-raiz-injerto como medio de aumentar la produccion de injerto sobre membrillo. [An improved method of budding quince stocks.]** Bol. Agric. Provincia Buenos Aires 1[2]: 2–6. *9 fig.* 1919.—The author describes a method of budding pear and apple on quince stocks which is said to give much better results than the system of grafting commonly employed. During the winter the stocks are cut back to force a bushy growth, and in the spring soil is heaped around each plant to permit extensive root development. Buds are inserted in each shoot produced and finally each of these, with a corresponding portion of root, is separated for planting.—*John A. Stevenson.*

1755. Bunyard, E. A. **A handbook of hardy fruits. Apples and pears.** *205 p.* John Murray: London, 1920.—"This volume is designed to fill the place formerly occupied by Dr. Hogg's Fruit Manual, which has now been out of print for some time. In preparing the present handbook, the author has endeavored to provide information in a popular form without any loss of accuracy." A classification and Key is given for both apples and pears, 356 varieties of the former being described and 157 of the latter.—*J. H. Gourley.*

1756. Calvino, Mario. **Informe de los años 1918–1919 y 1919–1920 de la estación experimental agronomica. [Report of the agricultural experiment station for 1918–1919 and 1919–1920.]** Informe An. Estac. Exp. Agron. [Cuba] 1918–1920: 1–786. *329 fig.* 1920.—During the 2 years under review experimental work has been carried on with a wide range of economic plants, including both indigenous and exogenous ones. The work has included varietal and cultural tests with the following plants: Sweet potatoes, cassava, malanga (*Xanthosoma* sp.), *Dioscorea* spp., *Maranta arundinacea*, *Calathea allouya*, *Cacara erosa*, many types of Cucurbits (including *Sicania odorifera*, *Trichosanthes anguira*, *Benincasa* spp., *Cucurbita moschata*, *Lagenaria leucantha*), tomatoes, peppers, cabbage, brussels sprouts, *Solanum muricatum*, *Jatropha urens* var. *inermis*, strawberries, pineapple, banana, plantain, citrus, mango, coffee, cacao, grape, and *Clitoria ternatea*.—*John A. Stevenson.*

1757. Chasset, L. **Quelques traces de fixité chez certaines variétés fruitières. [Some traces of fixity of certain varieties of fruits.]** Rev. Hort. 93: 298–299. 1921.—The seedlings of a number of varieties of apples and of pears often closely resemble the parents in various characters. Many examples are listed. It is possible that through long cultivation and vegetative multiplication of a variety greater fixity of its characters may be brought about.—*E. J. Kraus.*

1758. Crespo, Ulpiano. **El cafe, siembra, cultivo, recolección, y preparación. [Planting, cultivation, harvesting, and preparation of coffee.]** Rev. Agric. [Mexico] 5: 625–629. *4 fig.* 1921.

1759. Eaton, S. V. **Weather and fruitfulness.** [Rev. of: Dorsey, M. J. **Relation of weather to fruitfulness in the plum.** Jour. Agric. Res. 17: 103–126. *3 pl., 1 fig.* 1919 (see Bot. Absts. 3, Entries 1478, 1529).] Bot. Gaz. 69: 269. 1920.

1760. Fantini, N. **Una breve e interesante reseña sobre los principales sistemas de podas. [A brief review of the principal pruning systems.]** Surco [Argentina] 1[4]: 8–10. 1921.

1761. Gajón, Carlos. **Las fresas y su cultivo. [Strawberries and their culture.]** Rev. Agric. [Mexico] 6: 142–147. *12 fig.* 1921.—This paper gives a popular account of strawberry culture under Mexican conditions; a list of varieties is included.—*John A. Stevenson.*

1762. Georgeson, C. C., and C. H. Benson. **Report of work at Sitka station.** Rept. Alaska Agric. Exp. Sta. 1918: 22–33. 1920.—In the strawberry breeding work about 3000 seedlings fruited for the 1st time, and 1800 new seedlings were grown. One salmonberry-raspberry hybrid of 1916 bore promising fruit. Growing potatoes from seed balls is being continued with good results. Some crossing has been done with flowering plants. Vegetables which are favorably reported upon are: Cabbage, cauliflower, brussels sprouts, kale, kohl rabi, turnips, rutabagas, carrots, parsnips, parsley, chard, lettuce, radishes, peas, celery, and rhubarb. Chinese cabbage, beets, onions, leek, and spinach are not so satisfactory. Orchard fruits were reported upon unfavorably. Red raspberries, especially the Cuthbert, gooseberries, and currants produced well. Hybrids of *Ribes bracteosum* and *R. nigrum* produced fruit for the 1st time. Blueberries, dewberries, and blackberries are being tested. The eastern cranberry is a failure. Comparatively few ornamental trees and shrubs seem adapted to the climate. *Rosa rugosa* grows especially well, and 20 other roses survived the winter though 9 did not; 43 hardy perennials and 32 annuals are reported as satisfactory, while 2 perennials and 8 annuals were not successful.—*J. P. Anderson.*

1763. GIROLA, CARLOS D. **Fruticultura Argentina, apuntes y comentarios. [Notes on fruit culture in Argentina.]** Bol. Ministerio Agric. Nación [Argentina] 26: 29–59. *6 fig.* 1921.—By means of 5-year import tables the author shows the possibilities of developing the fruit-growing industry in Argentina. Brief suggestions for the culture of the following fruits are given: Peach, plum, cherry, pear, apple, quince, melon, watermelon, orange, lime, lemon, grapefruit, grape, fig, cherimola, guava, and others of minor importance. The best varieties of each which have been exhibited at local expositions are listed.—*John A. Stevenson.*

1764. IGLESIAS, R. M. **El cultivo del naranjo en el departamento de Rivera. [Orange culture in the Department of Rivera.]** Defensa Argic. [Uruguay] 2: 109–110. 1921.—Popular. —*John A. Stevenson.*

1765. INIGUEZ, IGNACIO FLORES. **El cultivo del naranja en Rio Verde, San Luis Potosi. [Orange cultivation.]** Rev. Agric. [Mexico] 5: 699–703. *1 fig.* 1921.—This article discusses varieties, planting, cultivation, pruning, picking, marketing, and enemies of the orange in the state of San Luis Potosi, Mexico.—*John A. Stevenson.*

1766. JIMENEZ, FAUSTINO W. **Cultivo de la fresa. [Culture of the strawberry.]** Rev. Soc. Rural Cordoba [Argentina] 20: 5324–5333. 1920.—General cultural directions and irrigation practice are given.—*John A. Stevenson.*

1767. LOPÉZ, CARLOS. **Cultivo de la jícama. [Jicama, or yam-bean, culture.]** Rev. Agric. [Mexico] 5: 624. *1 fig.* 1921.—Brief cultural directions are presented for *Pachyrhizus angulatus* (jícama de agua) and *P. tuberosus* (jícama de leche).—*John A. Stevenson.*

1768. MAZARIN. **Massnahmen zur Förderung des Zwetschenanbaues. [Measures for advancing prune culture.]** Mitteil. Deutsch. Landw. Ges. 36: 394–397. 1921.—In view of the reduced number of plum trees in Germany, due to loss of territory and winter killing, the author points out the need of selection, fertilizing, and other measures for increasing the supply of fresh and dried plums.—*A. J. Pieters.*

1769. POPENOE, WILSON. **Manual of tropical and sub-tropical fruits.** *xv+474 p., 24 pl., 62 fig.* Macmillan Co.: New York, 1920.—The author states that his intention is "to bring together for the guidance of those who live in the tropical and subtropical regions of the globe, the available information regarding the principal fruits cultivated or which may be cultivated in those regions."—The chief fruits treated are avocado, mango and its relatives, several annonaceous fruits, date, papaya and its relatives, loquat, fruits of the myrtle family, litchi and its relatives, sapotaceous fruits, kaki, pomegranate, jujube, mangosteen, breadfruit, etc. The author discusses the history, distribution, composition, and uses of the fruits, climate and soil, cultural methods, propagation, packing, marketing, and pests.—*J. H. Gourley.*

1770. RIVEROS, ERNESTO. **La poda de los frutales. [Pruning fruit trees.]** Rev. Soc. Rural Cordoba [Argentina] 20: 4994–5004. 1920.—Popular.—*John A. Stevenson.*

1771. SAEZ, DANIEL. **Los viñedos de Artigas. [The vineyards of Artigas.]** Defensa Agric. [Uruguay] 2: 112–114. 1921.—Suggestions are made for improving the viticulture of the district, including use of resistant roots, treatments for diseases, care in pruning, and selection of proper sites.—*John A. Stevenson.*

1772. SARABIA, GUILLERMO. **Cultivo del naranjo en Chile. [Orange culture in Chile.]** Bol. Soc. Agric. Norte [Chile] 10: 310–320, 325–328, 347–355, 375–379, 428–434. 1920.—Popular. —*John A. Stevenson.*

1773. SARABIA, G[UILLER]MO. **La arboricultura frutal en esta zona. [Fruit culture in this region.]** Bol. Soc. Agric. Norte [Chile] 10: 341–344. 1920.—This general discussion of fruit growing in North Chile includes a list of varieties of peach, plum, pear, orange, lemon, olive, grape, fig, quince, almond, walnut, apple, and cherry recommended for planting.—*John A. Stevenson.*

1774. Vallejo, Carlos. **La Riojo.** Bol. Ministerio Agric. Nación [Argentina] **25:** 447–468. *9 fig.* 1920.—This is a report of a journey through part of the province of La Rioja to investigate the possibilities of olive culture. A list of indigenous economic plants is given. —*John A. Stevenson.*

FLORICULTURE AND ORNAMENTAL HORTICULTURE

1775. Anonymous. **Het bollenpellen en de arbeidswet. [Bulb peeling and the labor law.]** Weekbl. Bloembollencult. **32:** 1–2. 1921.

1776. Dental, J. B. **Gerberas hybrides, race Dubois. [The Dubois race of Gerbera hybrids.]** Rev. Hort. **93:** 312. *1 pl. (colored).* 1921.—A race of double-flowered, variously colored forms of the Transvaal daisy, fixed by M. E. Dubois, is easily grown and deserving of more general planting.—*E. J. Kraus.*

1777. Downing, A. J. **Landscape gardening.** *10th ed., revised by* F. A. Waugh. *xiv+439 p., 48 fig.* J. Wiley & Sons: New York, 1921.—This book includes several chapters from Downing's original Landscape Gardening and the Rural Essays, which first appeared in the Horticulturist.—*J. H. Gourley.*

1778. Gadeceau, E. **La primevère auricule; sa culture, ses variétés. [Varieties and culture of Primula auricula.]** Rev. Hort. **93:** 336–337. *Fig. 83–84.* 1921.

1779. Gajón, Carlos. **Los mejores rosales. [The best roses.]** Rev. Agric. [Mexico] **6:** 67–78. *8 fig.* 1921.—This description of the varieties of roses best adapted to Mexican conditions includes cultural directions and proper methods of pruning and propagating.—*John A. Stevenson.*

1780. King, Frances. **The little garden.** *x+94 p., 9 fig.* Atlantic Monthly Press: Boston, 1921.

1781. Laplace, F. **Le Rosier Paul's scarlet climber. [Paul's scarlet climber rose.]** Rev. Hort. **93:** 352–353. *1 pl. (colored).* 1921.

1782. Laumonnier-Férard, E. **Gaillarde vivace hybride, var. Lady Rolleston. [A hardy Gaillardia hybrid, Lady Rolleston.]** Rev. Hort. **93:** 332–333. *1 pl. (colored).* 1921.—This is considered the best clear yellow, large flowered variety; several others are listed.—*E. J. Kraus.*

1783. Lesourd, F. **Trois cèdres du Liban historiques. [Three historical cedars of Lebanon.]** Rev. Hort. **93:** 350–352. *Fig. 89.* 1921.

1784. Letacq, A. **Le tulipier de Virginie aux environs d'Alençon. [The tulip tree in the region of Alençon.]** Rev. Hort. **93:** 356–357. *Fig. 93. 1921.*—This species grows very rapidly, is thoroughly hardy, and apparently adapted to forest planting as well as to ornamental purposes.—*E. J. Kraus.*

1785. Mathews, J. W. **The cultivation of Proteas and their allies.** Jour. Bot. Soc. South Africa **7:** 15–16. 1921.—The term "hard-wooded" applied to Proteas implies successful propagation from cuttings of ripened young wood or by grafts, but under the local conditions the easiest and most readily available method is by seeding.—*E. P. Phillips.*

1786. Mottet, S. **Campanula Van-Houttei.** Rev. Hort. **93:** 347–348. *Fig. 87–88.* 1921. —Historical and cultural notes are given.—*E. J. Kraus.*

1787. Mottet, S. **Les Lewisia. [The Lewisias.]** Rev. Hort. **93:** 329–331. *Fig. 79–80.* 1921.—*Lewisia cotyledon, L. Howellii,* and *L. vedrariensis,* a hybrid between the former 2, are suited to greenhouse culture and deserving of more extensive planting.—*E. J. Kraus.*

1788. OPAZO, AUGUSTO. **La haba. [Faba vulgaris.]** Bol. Soc. Agric. Norte [Chile] **10**: 335–357. 1920.—Popular.—*John A. Stevenson.*

1789. PROSCHOWSKY, A. R. **Un beau palmier hybride: Butiarecastrum Nabonnandi. [A beautiful hybrid palm.]** Rev. Hort. **93**: 290–291. *Fig. 72.* 1921.—This beautiful hybrid between *Butia capitata* var. *pulposa* Becc. and *Arecastrum Romanzoffianum australe* Becc. was secured by M. P. Nabonnand some 30 years ago. It scarcely resembles either parent, is of rapid growth, and would probably withstand a temperature of −15° C.—*E. J. Kraus.*

1790. RAGIONIERI, A. **Nouveaux muguets hybrides à grandes fleurs. [New large-flowered hybrids of lily-of-the-valley.]** Rev. Hort. **93**: 294–295. *1 pl. (colored).* 1921.—Many types of lily-of-the-valley, varying in size and form, and in color from white to rose, have been secured by crossing the several existing races. Two years are required for seed germination when grown in pots, and the seedlings bloom about 9 years after the crossing has been accomplished.—*E. J. Kraus.*

1791. RIVOIRE, A. **Quelques beaux Mimulus vivaces. [Some beautiful hardy Mimulus.]** Rev. Hort. **93**: 355–356. *Fig. 90–92.* 1921.—Especially noteworthy forms are the species *Mimulus cupreus, M. cardinalis, M. luteus, M. rivularis, M. variegatus,* and *M. radicans,* and several varieties which have come from them.—*E. J. Kraus.*

1792. SIMONDS, O. G. **Landscape gardening.** *xii+338 p., 1 pl., 59 fig.* Macmillan Co.: New York, 1920.—This book treats of the aims of landscape gardening; saving of natural features and resources; planting materials; arrangement of planting; how to plant; water; home grounds; farms; landscape gardening for arid and semi-arid regions; public thoroughfares; the grounds of railway stations and rights of way; parks, forest preserves, city squares; golf grounds; school grounds; arboretums and botanic gardens; cemeteries; and city and regional plantings.—*J. H. Gourley.*

VEGETABLE CULTURE

1793. ANONYMOUS. **O feijão da Birmania. [The lima bean.]** Bol. Agric. [Nova Goa] **2**: 22–24. 1920.—The lima bean (*Phaseolus lunatus*) gives promise as a crop for Portuguese India. Brief cultural directions are given.—*John A. Stevenson.*

1794. BAÑO, JOSÉ DE. **Tres tuberculos de importancia. [Three important roots.]** Rev. Agric. [Mexico] **5**: 630–631. *3 fig.* 1921.—*Curcuma tinctoria, Maranta arundinacea,* and *Zingiber officinale* are described briefly, with cultural directions.—*John A. Stevenson.*

1795. DOMINGO, MIGUEL GIL. **Fertilización de las cebadas. [Onion fertilization.]** Información Agric. [Madrid] **10**: 551–552. 1920.—Popular.—*John A. Stevenson.*

1796. HARTH, E. **Sortenanbauversuche mit Karotten im Jahre 1920. [Variety tests of carrots in 1920.]** Mitteil. Deutsch. Landw. Ges. **36**: 459–462. 1921.—Results are given of tests with 2 late and 2 early varieties of carrot on various types of soil.—*A. J. Pieters.*

1797. KINMAN, C. F. **Yam culture in Porto Rico.** Porto Rico Agric. Exp. Sta. Bul. 27. *22 p., 6 pl.* 1921.—The yam (*Dioscorea* spp.), which ranks 2nd among root crops in Porto Rico, and is grown in nearly every family garden, gives certain yields since it is generally free from insect pests and diseases and is adaptable to practically all soil types. Very little attention has been given to improved cultural practices. Highest yields are obtained when plantings are made in ridges of loosened soil bringing the roots above the water line. Plants should be 1–2 feet apart in the ridges depending upon the variety. Either entire roots or portions may be planted, although crown sections give best results. Bordeaux mixture prevents decay of seed pieces. Pruning the vines reduces yields. Supports should always be provided. In experimental work, fertilizers did not give sufficiently increased yields to warrant their use. Of native varieties, Guinea is most satisfactory, giving heavy yields and

possessing high food value. Mapuey morado sells at a higher price but yields less. The experiment station has introduced other types, several of which are especially recommended. —*John A. Stevenson.*

1798. SANCHEZ, N. **El cultivo del ajo. [Onion cultivation.]** Jalisco Rural [Mexico] **3:** 401–404. 1921.—Popular.—*John A. Stevenson.*

1799. VARELA, EFRÉN. **El cultivo del ajo en Tehuacan, Pueblo. [Onion culture in Tehuacan.]** Rev. Agric. [Mexico] **5:** 697–699. *1 fig.* 1921.—Popular.—*John A. Stevenson.*

1800. VARGAS, LEANDRO M. **Cultivo de la sandia. [Watermelon culture.]** Rev. Agric. [Mexico] **5:** 689–697. *7 fig.* 1921.—The author discusses watermelon culture under the general headings of varieties, soils, planting, cultivation, marketing, and enemies.—*John A. Stevenson.*

1801. VARGAS, LEANDRO M. **El melon. [The melon.]** Rev. Agric. [Mexico] **5:** 742–750. *11 fig.* 1921.—This popular account of melon-growing in Mexico from planting to harvesting includes descriptions of the better varieties. Scab (*Cladosporium* sp.), anthracnose (*Colletotrichum lagenarium*), and wilt (*Bacillus* spp.) are the diseases to be guarded against.—*John A. Stevenson.*

HORTICULTURAL PRODUCTS

1802. ANONYMOUS. **Export of South African dried fruit. The regulations controlling the trade.** Jour. Dept. Agric. Union of South Africa **2:** 536–540. 1921.

1803. ANONYMOUS. ***Fabricación de la harina de plátano.* [Manufacture of banana flour.]** Información Agric. [Madrid] **11:** 244–246. 1921.—This is a popular account of the manufacture of banana flour.—*John A. Stevenson.*

1804. ANONYMOUS. **The pineapple canning industry.** South African Jour. Indust. **4:** 410–417. *4 fig.* 1921.—An account is given of the process of canning pineapples at the Port Elizabeth factory. The fruit is grown at the Langholm Estates, Bathurst.—*E. M. Doidge.*

1805. ANONYMOUS. [Rev. of: WHYMPER, R. **Cocoa and chocolate; their chemistry and manufacture.** *2nd ed., xxi+568 p., 15 pl.* J. and A. Churchill: London, 1921.] Nature **107:** 713. 1921.

1806. BAÑO, JOSÉ DE. **Elaboración de la pasa de higo. [Preparation of dried figs.]** Rev. Agric. [Mexico] **6:** 210–212. *3 fig.* 1921.—This is a description of the methods used in California for drying figs.—*John A. Stevenson.*

1807. BURNS, WILLIAM, E P. G. JOSHI. **A secagem da banana. [Banana drying.]** Bol. Agric. [Nova Goa] **2:** 62–69. 3 *fig.* 1920.—This article reports on experiments in drying bananas in Bombay.—*John A. Stevenson.*

1808. MAGAÑA, JUAN B. **Preparación de las aceitunas. [Preparation of olives.]** Rev. Agric. Tropic. [Salvador] **1:** 15–19. 1921.—A brief description is given of methods of preparing olives and extracting olive oil.—*John A. Stevenson.*

1809. PIMENTAL, ARTURO. **Desecación de las ciruelas. [Drying plums.]** Bol. Ministerio Agric. Nación [Argentina] **26:** 22–27. *6 fig.* 1921.—Popular.—*John A. Stevenson.*

1810. PRESTI, NICOLÁS. **Conservación de fruta fresca. [Preservation of fresh fruit.]** Bol. Agric. Provincia Buenos Aires 1^{10}: 7–12. *3 fig.* 1920.—The author discusses temperature, humidity, and light conditions to be maintained in fruit storage houses.—*John A. Stevenson.*

1811. Puig, Juan. **Estudios y observaciones sobre viti-vinicultura. [Studies in viticulture and wine-making.]** Inspeción Nacion. Ganaderia y Agric. [Uruguay] Bol. 38. *142 p., 14 fig.* 1920.—The author reviews the experimental work in grape-growing and wine-making carried on over a period of 5 years at the agronomical laboratory at Sayago, Uruguay. The results of chemical tests to determine density, acidity, and sugar content of the expressed juice and resulting wines from all available varieties for these years are tabulated. Studies were made of the time of ripening of the fruit of varieties under trial.—*John A. Stevenson.*

1812. Tevis, May. **The attar of roses.** Sci. Amer. Monthly **3**: 409–413. *9 fig.* 1921.—French and Bulgarian methods of producing the essential oil of rose petals are described.—*Chas. H. Otis.*

1813. Torres, Antonio. **Aceite de los huesos de las aceitunas. [Oil from olive pits.]** Bol. Agric. Téc. y Econ. [España] **12**: 676–680. 1920.

1814. Torres, Antonio. **Aprovechamiento de los residuos de la fabricación de aceite de oliva. [Use of the residues from the manufacture of olive oil.]** Bol. Agric. Téc. y Econ. [España] **12**: 420–432. 1920.—The residue remaining after the extraction of oil from olives can be utilized for manufacturing fertilizers, alcohol, and other products.—*John A. Stevenson.*

1815. Wolk, P. C. van der. **Het fermenteeren van muskaat-noten. [Fermenting of nutmeg.]** Cultura *33: 255–259. 1921.*—The fermentation of nutmegs before marketing is frequently mentioned in literature before 1800, but subsequently the practice was abandoned. After the mace and shells were removed, the fruits were dried, sorted, and placed in a brine of lime and sea water. The wet nuts were then placed in boxes and left up to 3 months, during which time fermentation took place. Finally the fruits were dried. The suggestion is made that this fermentation process should again be used as it is said to improve the quality of the nuts.—*J. C. Th. Uphof.*

MORPHOLOGY, ANATOMY AND HISTOLOGY OF VASCULAR PLANTS

E. W. Sinnott, *Editor*

(See also in this issue Entries 1463, 1489, 1602, 1678, 1681, 1682, 1872, 1874, 1940, 2000)

1816. Arber, Agnes. **The leaf structure of the Iridaceae considered in relation to the phyllode theory.** Ann. Botany **35**: 301–336. *66 fig.* 1921.—The theory that the monocotyledonous leaf is morphologically a phyllode is applied to the various types found in the Iridaceae. The ensiform (equitant isobilateral) type is shown to be similar in many respects (even in its occasional association with a winged axis) to the phyllodes of *Acacia*. It is regarded as a petiolar phyllode and not the result of congenital concrescence as stated by other authors. The "radial" types found in certain species are shown to be variants on the ensiform type. The dorsiventral type with cylindrical apex is regarded as a leaf-base phyllode terminating in a more or less vestigial petiole, while the type which is dorsiventral to the extreme tip is regarded as entirely leaf base. The peculiar foliated types of *Babiana, Cypella,* etc., are shown to arise from a simple petiolar structure through invaginations sometimes associated with the development of keels or wings. The leaves of Crocoideae are also interpreted as petiolar phyllodes, the divergent types being due to different forms of invagination. The general course of evolution of the leaf of this family is discussed and it is concluded that the ensiform type is primitive for the family and that the other types have been derived from it either by the reduction of the petiolar region, or by the elaboration of this region through winging or invagination.—*W. P. Thompson.*

1817. Betts, M. Winifred. **Notes from the Canterbury College Mountain Biological Station, Cass. No. 7.—The rosette plants Part I.** Trans and Proc. New Zealand Inst. **52**: 253–275. *35 fig.* 1920.—This paper gives a list of the indigenous rosette plants, numbering

23 forms, found in the neighborhood of the station. The present paper treats only part of these. Details of the general morphology and histology of root, stem, and leaf are given for the following plants: *Geum parviflorum* Sm., *Cardamine heterophylla* (Forst. f.) O. E. Schulz (var.), *Plantago triandra* Berggr., *Brachycome Sinclairii* Hook. f., *Gnaphalium Traversii* Hook. f.—*Wm. Randolph Taylor.*

1818. BETTS, M. WINIFRED. **Notes on the autecology of certain plants of the Peridotite Belt, Nelson: Part I—Structure of some of the plants (No. 3).** Trans. and Proc. New Zealand Inst. **52**: 276–314. *48 fig.* 1920.—A continuation of a series of detailed descriptions of the habit and the histology of the leaves and stems of plants of the Peridotite Belt. The following species and varieties are considered in this paper: *Cyathodes acerosa* R. Br., *Gentiana corymbifera* T. Kirk., *Myosotis Monroi* Cheesm., *Euphrasia Monroi* Hook. f., *Wahlenbergia albomarginata* Hook., *Celmisia longifolia* Cass. var. *gracilenta* T. Kirk., *Olearia virgata* Hook. f., *Helichrysum bellidioides* Hook. f., *Cassinia Vauvilliersii* Hook. f. var. *rubra* Buch., *Senecio bellidioides* Hook. f., *Gahnia procera* Forst., *Astelia montana* (T. Kirk) Cockayne, *Dianella intermedia* Endl., *Libertia ixioides* Spreng.—*Wm. Randolph Taylor.*

1819. BLOCK, MME. E. **Modifications des racines et des tiges par action mécanique. [Modifications of roots and stems by mechanical action.]** Compt. Rend. Acad. Sci. Paris **172**: 1524–1526. *Fig. 1–6.* 1921.—Roots of radish and sweet pea and stems of black nightshade and buckwheat were studied. A portion of each was enclosed in a glass tube or between glass plates, the remaining portions of the plant meanwhile continuing their development under normal conditions. Development takes place above and below the encasement in all instances. In stems, an enlargement or pad is formed above the encasement. Stems of *Impatiens parviflora* form rootlets just below the encasement, but in *Helianthus annuus* just above this region. No suberized phelloderm is formed beneath the glass as it is above and below and in the controls. Root development above and below the encasement is normal.—*C. H. Farr.*

1820. BÖÖS, GEORG. **Ueber die Natur einer gewissen Blütenanomalie bei Ranunculus acris L. [The nature of a flower anomaly in Ranunculus acris.]** Bot. Notiser **1920**: 151–154. *Fig. 1–11.* 1920.—The author describes some anomalous flowers of *Ranunculus acris* found at the botanic museum at Lund. The petals, stamens, and pistils had more or less reverted into phyllomes. The petals were about half as long as in normal flowers, more or less 3-lobed at the apex, yellowish green in the center like the sepals, pure yellow only along the margins, without a nectary at the base, and hairy instead of glabrous on the back; the filaments were more or less flattened and hairy; the anthers flat and containing less pollen than the normal ones; the pistils hairy, not keeled on the upper margin, but mostly open, and without ovules.—*P. A. Rydberg.*

1821. BROWNE, ISABEL M. P. **A fourth contribution to our knowledge of the anatomy of the cone and fertile stem of Equisetum.** Ann. Botany **35**: 428–456. *Pl. 21, 12 fig.* 1921.—The vascular systems of the cones of *E. sylvaticum*, *E. debile*, and *E. variegatum* are described in detail. That of *E. debile* is much reduced and forms an irregular loose network. Numerous parenchymatous meshes originating below the cone persist for a considerable distance into the cone or throughout its full length. The stele of *E. variegatum* is also somewhat reduced. The separation of the protoxylem and metaxylem in the internodes of certain species is regarded as a derivative character due to reduction. A comparative study confirms the view that the meshes arose at points vertically above the sporangiophoric traces, though at a certain height above this level. In certain cases the approximation of the meshes to the point of the departure of the traces is due to reduction of the xylem during phylogeny. The meshes are therefore not true gaps. Evidence is adduced in support of the view that the insertion of the annulus marks the position of a vestigial node.—*W. P. Thompson.*

1822. CUTTING, E. M. **Observations on variations in the flowers of Stachys sylvatica Linn.** Ann. Botany **35**: 409–426. *5 fig.* 1921.—Plants of *Stachys sylvatica* were observed showing

many variations such as peloria, semi-peloria, fasciations, synanthy, increase and reduction in the number of parts of all 4 whorls, abortion of stamens, etc. Early in the year the tendencies exhibited are toward an increase in the number of parts, especially in the androecium and gynoecium, and toward fasciation. Such variations are usually found in the middle flowers. In the autumn the commonest variation is a bifurcation in the upper lip of the corolla, and specimens showing this are fewer in warm, sunny situations. In the autumn also the abortion of stamens is commonest, and this is accompanied by a marked decrease in the size of calyx and corolla, the side flowers withering without opening. Throughout the year flowers with a reduced number of parts in the corolla are common.—*W. P. Thompson.*

1823. Dusén, P., und F. W. Neger. **Über Xylopodien.** [Xylopodia.] Beih. Bot. Centralbl. **38**: 258–317. *Pl. 10, 20 fig.* 1921.—In 1900 Lindman described as "xylopodia" the hard tuberous thickenings of the underground parts of the shrubby and dwarfed plants of the steppes of southern Brazil. Many plants possess these structures. Many xylopodia are described as to characteristics of the bark, structure of the woody parts, and presence of reserve material and other contents. The xylopodium is root as often as stem, often root in one species and stem (rhizome) in another in the same family and even in the same genus. The parenchyma is remarkably developed. The unusual hardness is due to: (1) Hard bark, 1–2 mm. thick, of thickwalled stone cells; (2) cell walls of the parenchyma more or less silicified; (3) inorganic substances such as calcium oxalate or calcium carbonate. The arrangement of the tissues is rather regularly radial in the larger xylopodia, but in the more nearly oval ones it is not always easy to distinguish between longitudinal, tangential, and cross sections. These oval ones also have fewer and smaller bundles. Growth rings appear in some, but it is not known whether these are annual rings. The few xylopodia known in Europe do not differ essentially from the Brazilian forms so far as investigated.—*L. Pace.*

1824. Feustel, Herm. **Anatomie and Biologie der Gymnospermblätter.** [Anatomy and biology of gymnosperm leaves.] Beih. Bot. Centralbl. 38: 177–257. 1921.—A review and discussion is presented of the literature on this subject. The Pteridosperms (Cycadofilices), Cycadales, Bennettitales, Cordaitales, Ginkgoales, families of the Coniferales, and Gnetales are considered, the epidermis, stomata, hypodermis, mesophyll, secretory system, vascular bundle, transfusion tissue, rhachis, and bundle trace being discussed.—*L. Pace.*

1825. Hofmeyr, Joan. **A note on the germination of the seed of Elephantorrhiza Burchellii.** South African Jour. Nat. Hist. 3: 215–216. 1921.—A hollow cotyledonary tube carries the plumule and radicle down into the soil. The plumule develops within this cotyledonary tube and eventually pierces the wall, the resulting shoot coming above the ground. Throughout the germination the cotyledons remain below the ground and function as a storehouse upon which the developing seedling draws for its nourishment.—*E. P. Phillips.*

1826. Holloway, J. E. **Studies in the New Zealand species of the genus Lycopodium: Part IV.—The structure of the prothallus in five species.** Trans. and Proc. New Zealand Inst. **52**: 193–239. *Pl. 12–15, 75 fig.* 1920.—The species described are *L. Billardieri* Spring, *L. Billardieri gracile* T. Kirk, and *L. varium* R. Br. Prodr. of the section *Phlegmaria;* and *L. cernuum* L., *L. laterale* R. Br. Prodr., and *L. ramulosum* T. Kirk of the section *Cernua.* The species of the former section are very similar in general shape. The central body, more or less elongated, bears a number of adventitious branches. In the main body the fungal symbiont is present throughout the older portion, though more scattered forward. The tips of the branches and the forward end of the central body are free from fungus. This latter is the main generative region and bears paraphyses, antheridia, and archegonia. In the section *Cernua, L. cernuum* and *L. laterale* are very similar. The prothallus consists of a basal "primary tubercle" supporting a shaft which terminates above in a crown of lobes beneath which lies the meristem and the sexual organs. The prothallus grows at the surface of the ground and has green lobes and a radial structure. The fungus is present in the primary tubercle and in lateral extensions from this area, or sometimes in a second swelling part way up the shaft. The prothallus of *L. ramulosum* varies greatly, however. The structure of all 5 species is described in detail.—*Wm. Randolph Taylor.*

1827. LANGDON, LADEMA M. **Storied structure of dicotyledonous woods.** [Rev. of: RECORD, S. J. **Storied or tierlike structures of certain dicotyledonous woods.** Bull. Torrey Bot. Club 46: 253–273. 1919 (see Bot. Absts. 3, Entry 2442).] Bot. Gaz. 69: 270. 1920.

1828. LANSDELL, K. A. **Weeds of South Africa. I., II. and III.** Jour. Dept. Agric. Union of South Africa 2: 315–321. *Fig. 1–11*; 2: 541–551; 3: 172–177. *Fig. 12–59.* 1921.—General descriptions and illustrations are given of the morphology of flowers, fruits, and leaves of South African weeds.—*E. M. Doidge.*

1829. PUJIULA, J. **Contribución al conocimiento anatómicofisiológico de los zarcillos de la zarzaparrilla (Smilax aspera). [Contribution to the knowledge of the anatomy and physiology of the tendrils of Smilax aspera.]** Brotéria Sér. Bot. 19: 66–72. *Fig. 1.* 1921.—Contact irritability in the tendrils of *Smilax aspera* seems a general function of the epidermal cells, no special correlated structures being visible in microscopic sections. Such sections, however, show great and irregular thickenings of the transverse cell walls, the lumen at times being wholly filled; this is true even of the guard cells of stomata with an apparent loss of function. The author concludes that the thickening is in response to mechanical stresses after the tendril has secured support, and that coincidentally ability to respond to stimulation is lost.—*E. B. Chamberlain.*

1830. SHOWALTER, A. M. **An orthotropous ovule in Hyacinthus orientalis L.** Torreya 21: 62–63. *Fig. 1–2.* 1921.—An ovule in the upper part of an ovary was found to be orthotropous instead of anatropous, but typical in all other respects. In the median portion of the ovary the carpels seemed to be imperfectly fused and the placentas slightly displaced.—*J. C. Nelson.*

1831. SUESSENGUTH, KARL. **Beiträge zur Frage des systematischen Anschlusses der Monokotylen. [Contributions to the systematic relationships of the monocotyledons.]** Beih. Bot. Centralbl. 38: 1–79. *Fig. 1–18.* 1921.—The following criteria are considered important in deciding the relationships of the monocotyledons: (1) Microspore development, periplasmodium; (2) development and structure of the embryo-sac and young ovules; (3) endosperm and perisperm; (4) embryo; (5) flower structure; (6) bundle structure and arrangement and cambium; (7) leaf structure; (8) root structure; (9) serum reaction.—After the heterotypic division in monocots, the daughter cells develop walls, whereas in dicotyledons walls appear only after the 4 nuclei are formed. These are known respectively as the successive and simultaneous methods of pollen formation. The latter is phylogenetically the older as it is found in Gymnosperms and commonly in pteridophytes and mosses. The embryo sac and megaspore do not seem to furnish any distinctive characters for either group. Besides a comparison of those already investigated, the author studied *Dioscorea, Tacca, Cyperus, Hydrocleis* with normal sacs, and *Chamoedorea* with a 4-nucleate sac. Most monocotyledons and many of the choripetalous and some of the sympetalous dicotyledons have endosperm showing free simultaneous division,—Palm's "nuklearem" type. Monocotyledony is considered as ecologically induced. The flower structure is probably the most important reason for regarding the group as monophyletic.—*L. Pace.*

1832. THODAY, MARY G. **Ripening of seed in Gnetum gnemon and Gnetum africanum.** South African Jour. Sci. 17: 189–192. *2 fig.* 1921.—The structure of the mature seed is of interest ontogenetically in showing a method of closing the pollinated ovule of a gymnosperm. It is also of importance in connection with the comparison made between the seeds of the Gnetales and those of the Bennettitales.—*E. P. Phillips.*

1833. WAGER, H. A. **The leaves of Hakea pectinata and H. suaveolens.** South African Jour. Sci. 17: 284–286. *2 fig.* 1921.—The leaf of the former species has probably evolved on xerophytic lines from a flat, more expanded, and delicate type. The latter species still shows xerophytic characters, such as toughness, thick cuticle, and sunken stomata. This is considered as a case of reversion in that the type of leaf found in *H. suaveolens* has evolved from that of *H. pectinata*.—*E. P. Phillips.*

1834. WELLS, B. W. **A phenomenal shoot.** Jour. Elisha Mitchell Sci. Soc. **36**: 15. 1920.—A shoot of *Pawlonia tomentosa* is recorded as reaching in 1 year a height of 19 feet 5 inches and a diameter of 2 feet 5 inches.—*W. C. Coker.*

1835. WRIGHT, GERTRUDE. **Pit-closing membrane in Ophioglossaceae.** Bot. Gaz. **69**: 237–247. *2 pl., 6 fig.* 1920.—The only torus found among the cryptogams was in *Botrychium* and *Helminthostachys*, forms in which pits are circular, broad-bordered, and round-pored. *Ophioglossum* has a uniform membrane, as is the case in *Isoetes, Psilotum, Equisetum,* and *Pteris,* although both Strasburger and DeBary claimed that there is a torus in *Pteris.* The form of the torus in *Botrychium* and *Helminthostachys* resembles closely the type found in the lower gymnosperms, *Ginkgo,* and the araucarians.—*H. C. Cowles.*

MORPHOLOGY AND TAXONOMY OF ALGAE

E. N. TRANSEAU, *Editor*

L. H. TIFFANY, *Assistant Editor*

(See in this issue Entry 1937)

MORPHOLOGY AND TAXONOMY OF BRYOPHYTES

ALEXANDER W. EVANS, *Editor*

(See also in this issue Entries 1533, 1535, 1967, 1968, 2058, 2066)

1836. CHAMBERLAIN, EDWARD B. **A catalogue of Portuguese mosses.** [Rev. of: MACHADO, ANTONIO. **Catálogo descritivo de briologia portuguesa.** (**Descriptive catalogue of Portuguese mosses.**) *143 p.* Lisbon, 1919 (see Bot. Absts. 8, Entry 1266).] Bryologist **24**: 44–46. 1921. —The reviewer sums up the work upon Portuguese bryophytes previous to the list at hand and outlines tbe scope of Machado's work, commending the careful citation of geographic distribution and the lack of "new species" but criticising the nomenclatorial changes. A list of the proposed new combinations follows, and there is an attempt at correcting certain of the typographic and other errors.—*E. B. Chamberlain.*

1837. DIXON, H. N. **Miscellanea bryologica—VII.** Jour. Botany **59**: 132–139. 1921.—The 6th number of this series has already been abstracted (see Bot. Absts. 3, Entry 701). In the present number *Hypnum replicatum* Hampe of Ceylon is first considered and is referred to the genus *Sematophyllum*, under the name *S. replicatum* (Hampe) comb. nov., *S. pilotrichelloides* Card. & Dixon being included among its synonyms. Critical or distributional notes on the following species are then given: *Rigodium dentatum* Dixon, erroneously recorded from Transvaal but really based on Cape Town material; *Eurhynchium meridionale* De Not., *Tortula inermis* (Brid.) Mont., *Didymodon riparius* (Aust.) Kindb., *Discelium nudum* Brid., and a peculiar form of *Dicranum fuscescens* Turn., all of which are reported from localities in the British Isles; *Ectropothecium australe* Jaeg. of Campbell Island, the proper name of which is said to be *Isopterygium limatum* (Hook. f. & Tayl.) Broth.; *Barbula apoclada* Par. of Argentina, which should be known as *B. perrevoluta* C. M.; *Schwetschkea usambarica* Broth. of East Africa; *Myurium Foxworthyii* Broth. of the Philippine Islands; *Fontinalis antipyretica* L., reported for the first time from South Africa; *Hypnum secundifolium* C. M. of Cape Horn, which is referred to the genus *Drepanocladus*, under the name *D. secundifolius* (C. M.) comb. nov.; *Neckera glossophylla* Mitt. of India, which is reduced to synonymy under *Homaliodendron microdendron* (Mont.) Fleisch.; *Pinnatella elegantissima* (Mitt.) Fleisch. of the East Indies and Oceanica, which is regarded as a synonym of *P. Kuhliana* (Bry. jav.) Fleisch.; and *Gymnostomum oranicum* Rehm. of South Africa, the correct name of which is said to be *Weisia oranica* (Rehm.) C. M.—*A. W. Evans.*

1838. DOUIN, CH. **La famille des Céphaloziellacées. [The family Cephaloziellaceae.]** Mém. Soc. Bot. France **63**[bis]: 1–90. *Pl. 1–9.* 1920.—The Cepbaloziellaceae represent a group

of minute leafy hepatics with bilobed leaves. It is based on the old genera *Dichiton*, *Cephaloziella*, and *Prionolobus*, but the author segregates from *Cephaloziella* the genera *Lophoziella*, *Evansia*, and *Protocephaloziella*, all of which he had characterized in an earlier article. The present work is divided into a general and a special part. In the former he discusses the characters of the family and attaches especial importance to those drawn from the sporophyte, such as the arrangement of cells in the pedicel and the histological features of the capsule-valves. He shows also that the group is amply distinct from *Cephalozia* and its allies, with which *Cephaloziella* and *Prionolobus* were previously associated. The 6 genera which he recognizes he bases largely on characters derived from the gemmae and involucral leaves, and he insists on the importance of definite morphological characters in distinguishing the species. In the special part he gives detailed keys to the genera, species, subspecies, and varieties of the entire world, assigning 1 species to *Dichiton*, 2 to *Lophoziella*, 3 to *Prionolobus*, 4 to *Evansia*, 1 to *Protocephaloziella*, and 55 to *Cephaloziella*. The following new species are proposed, Douin being the authority unless otherwise noted: *Cephaloziella alpina* (Northern Hemisphere), *C. antarctica* (antarctic region), *C. arvernensis* (France), *C. Brinkmanni* (North America), *C. cibulkensis* (Bohemia and the Adriatic region), *C. gallica* (France), *C. Holzingeri* (North America), *C. hyalina* (Florida), *C. inaequiloba* Schiffn. (Himalayas), *C. Levieri* Schiffn. (Tasmania), *C. norvegica* (Norway), *C. pentagona* (Africa, Japan, and Oceanica), *C. Rappii* (Florida), and *C. Stephanii* Schiffn. (Java). At least 2 of these species have already been published without descriptions, but the list does not include several other species designated as new, owing to the fact that Douin has briefly characterized them in earlier works. The following new subspecies are likewise proposed: *C. glacialis* (Europe) and *C. Lorenziana* (U. S. A.) under *C. alpina; C. turfacea* (Austria) under *C. rubella* (Nees) Warnst.; *C. carnutensis* (France), *C. nigrimonasteriensis* (France), and *C. scabrifolia* Douin & Schiffn. (U. S. A.) under *C. Starkii* (Funck) Schiffn.; *C. angustiloba* (U. S. A.) and *C. spinosa* (Sweden) under *C. striatula* (C. Jens.) Douin. There are in addition many new combinations, necessitated by the transference of species or by their reduction to subspecific or varietal rank. In the following list only the new specific combinations are given: *C. arenaria* (Steph.), *C. capillaris* (Steph.), *C. hirta* (Steph.), *C. Kiaeri* (Aust.), *C. minima* (Aust.), *C. patulifolia* (Steph.), *C. Pearsoni* (Spruce), *C. Spegazziniana* (Massal.), *C. subbipartita* (Massal.), *C. subtilis* (Lindenb. & Gottsche), *C. Welwitchsii* (Steph.), and *Lophoziella rhizantha* (Mont.).—*A. W. Evans.*

1839. LESAGE, PIERRE. **Cultures expérimentales du Fegatella conica et de quelques autres muscinées. [Experimental cultures of Fegatella conica and of some other bryophytes.]** Compt. Rend. Acad. Sci. Paris **172**: 1521–1523. 1921.—This paper presents a continuation of studies previously reported. Three forms of *Fegatella conica* were found growing in the greenhouse under different environmental conditions. They may be converted one into the other by altering the conditions.—*C. H. Farr.*

1840. LUISIER, A. **Les mousses de Madère. [Mosses of Madeira.]** Brotéria Sér. Bot. **19**: 73–96. 1921.—A continuation of a series of articles (see Bot. Absts. 9, Entry 1506). The present installment contains keys to the acrocarpous genera from *Tortula* (pars) to *Webera*. The whole moss flora of the Atlantic Islands is being covered.—*E. B. Chamberlain.*

1841. MEYLAN, CH. **Nouvelles contributions à la flore bryologique du Jura. [New contributions to the moss flora of the Jura Mountains.]** Rev. Bryologique **48**: 1–5. 1921.—The author records the results of his exploration in the Jura Mountains since 1919. Thirty species of mosses are listed with full data regarding localities and, in several cases, with critical observations. Of the species included, *Pohlia pulchella* (Hedw.) Lindb. represents an addition to the Swiss flora, *Eurhynchium Stokesii* (Turn.) Br. & Sch. is definitely recorded for the 1st time from Switzerland, and 4 others represent additions to the flora of the Jura region. Under *Thuidium abietinum* (L.) Br. & Sch. a new variety *paludosum* is proposed and *Th. hystricosum* Mitt. is reduced to varietal rank.—*A. W. Evans.*

1842. Meylan, Ch. **Une nouvelle variété de Scorpidium scorpioides. [A new variety of Scorpidium scorpioides.]** Rev. Bryologique **48**: 5. 1921.—The new variety bears the name *cuspidatum* and is based on specimens collected by Rohrer on the island of Reichenau in Lake Constance, Baden.—*A. W. Evans.*

1843. Potier de la Varde, R. **Hildenbrandtiella Soulii Broth. et P. de la V. (sp. nov. usambarica).** Rev. Bryologique **48**: 9–11. *7 fig.* 1921.—Under the above name the author describes and figures a new moss collected by J. Soul at Kinvani in the district of Usambara, Tanganyka Territory, Africa. At the close of the paper he lists 7 other mosses from the same region.—*A. W. Evans.*

1844. Potier de la Varde, R. **Observations sur quelques espèces du genre Fissidens. [Observations on certain species of the genus Fissidens.]** Rev. Bryologique **48**: 5–9. *3 fig.* 1921.—The earlier parts of this article have already been abstracted (see Bot. Absts. 5, Entry 628; 6, Entry 158; 7, Entry 1975). In the present installment *Fissidens Mildeanus* Schimp. is discussed, the author's observations being largely based on material which he collected in the department of the Manche, France. This material grew along the banks of brooks in localities which are submerged except in unusually dry seasons; 4 other mosses and 2 hepatics from similar stations are listed. In connection with the Fissidens the propagula are described and figured, the idea being advanced that they are homologous with axillary hairs and rhizoids.—*A. W. Evans.*

1845. Potier de la Varde, R. **Une correction au nom de Weisia viridula Brid. var. longifolia Thér. et P. de la V. [A correction of the name Weisia viridula var. longifolia.]** Rev. Bryologique **48**: 11. 1921.—The Weisia here alluded to was described in an earlier paper by the author on African mosses (see Bot. Absts. 9, Entry 347). A change of name is necessitated on account of an earlier var. *longifolia* Broth. & Wager, and the new varietal name *macrophylla* Thér. et P. de la V. is proposed.—*A. W. Evans.*

1846. Thériot, I. **Considérations sur la flore bryologique de la Nouvelle-Calédonie et diagnoses d'espèces nouvelles. [Remarks on the bryological flora of New Caledonia and diagnoses of new species.]** Rev. Bryologique **48**: 11–16. 1921.—The introductory portion of this paper on the mosses of New Caledonia has already been abstracted (see Bot. Absts. 10, Entry 611). In the present installment 12 species are enumerated and discussed, with full data regarding localities. Three new varieties and the following new species are proposed, Thériot being the authority except where otherwise indicated: *Barbula Franci*, *Calymperes Franci*, *Dicranoloma confusum*, *Dicranum dubium* Thér. & Dixon, *Fissidens humicolus*, *F. latinervis*, and *Trichostomum laticostatum*. Four of these new species were based on specimens collected by I. Franc.—*A. W. Evans.*

MORPHOLOGY AND TAXONOMY OF FUNGI, LICHENS, BACTERIA, AND MYXOMYCETES

H. M. Fitzpatrick, *Editor*

(See in this issue Entries 1752, 1861, 1870, 1876, 1877, 1956 and those in the Section Pathology)

PALEOBOTANY AND EVOLUTIONARY HISTORY

Edward W. Berry, *Editor*

(See also in this issue Entries 1831, 1832)

1847. Carpentier, A. **Découverte d'une flore wealdienne dans les environs d'Avesnes (Nord). [The discovery of a Wealden flora in the vicinity of Avesnes.]** Compt. Rend. Acad. Sci. Paris **172**: 1428–1429. 1921.—A number of species were found near Avesnes in France

which are characteristic of the Wealden flora (Lower Cretaceous) of Europe. An especially large number of Coniferales and ferns are reported.—*C. H. Farr.*

1848. Chandler, M. E. J. **Note on the occurrence of Sequoia in the Headon beds of Hordwell, Hants.** Ann. Botany *35*: *457. 1921.*—Well preserved material consisting of twigs, leaves, cones, and seeds of *Arthrotaxis Couttsiae* Starkie Gardner, were found in Gardner's original locality at Hordwell, Hants. They proved on careful examination to be *Sequoia*, as most paleobotanists except Starkie Gardner have always considered them.—*W. P. Thompson.*

1849 Church, A. H. **The lichen life cycle.** Jour. Botany 59: 139–145, 164–170, 197–202, 216–221.. 1921.—Through a detailed comparison with Laboulbeniaceae and Florideae, the author comes to the conclusion that the lichen fungi represent relics of a distinct race, derived from marine ancestors, "but presenting while still in the sea a somatic organization of high grade, fully complementary to the advanced conditions of their reproductive mechanism and life-cycle. . . . In pool formations of standing water, these heterotrophic survivors have picked up intrusive algae, to recover vicariously photosynthetic relations with the free atmosphere." Through the periodic or permanent drying up of these pools, the xerophytic condition we now know was attained.—*Adele Lewis Grant.*

1850. Menzel, P. **Über hessische fossile Pflanzenreste.[On fossil plants from Hesse.]** Jahrb. Preuss. Geol. Landes. 41^1: 340–391. *Pl. 14–18.* 1921.—Small Tertiary florules from eight different localities in Hesse are described. The following forms are new: *Cyclobalanopsis gracilis, Styrax blanckenhornii, Laurophyllum apolloniaceum, Viburnum schultzii, Leguminosites vicioides, Phyllites knemaeformis, Carpolithes circumcinctus.*—*E. W. Berry.*

1851. Potonié, R. **Der mikrochemische nachweis fossiler kutinisierter und verholzter Zellwände sowie fossiler Zellulose und seine Bedeutung für die Geologie der Kohle. [Microchemical test for cutinization and lignification of the cell wall, also fossil cellulose and their bearing on the geology of coal.]** Jahrb. Preuss. Geol. Landes. 41^1: 132–188. *Fig. 2.* 1920.

PATHOLOGY

G. H. Coons, *Editor*

C. W. Bennett, *Assistant Editor*

(See also in this issue Entries 1448, 1456, 1462, 1469, 1508, 1509, 1520, 1523, 1642, 1687, 1696, 1704, 1752, 1771, 1801, 1964, 1966, 1971, 1973, 1974)

PLANT DISEASE SURVEY: REPORTS OF DISEASE OCCURRENCE AND SEVERITY

1852. Anonymous. **The "Fiji disease" of sugar-cane.** Jour. Dept. Agric. Union of South Africa 2: 554–556. 1921.—This is a general account of the occurrence of this disease in Fiji, New Guinea, and Hawaii, and of the symptoms and cause so far as they are at present known.—*E. M. Doidge.*

1853. Bijl, Paul A. van der. **A paw-paw leaf spot caused by a Phyllosticta sp.** South African Jour. Sci. 17: 288–290. 1921.—A leaf spot, or shot hole, disease of pawpaws is here described which is said to be caused by *Phyllosticta caricae-papayae.*—*E. M. Doidge.*

1854. Bruner, S. C. **Informe sobre enfermedades del cafeto. [Coffee diseases.]** Informe An. Estac. Exp. Agron. [Cuba] 1918–20: 628–632. *2 fig.* 1920.—Three coffee diseases have been found in Cuba, thread blight (*Pellicularia koleroga*), and 2 leaf spots, due respectively to *Stilbella flavida* and *Cercospora coffeicola.* The symptoms of these diseases are given and control measures outlined.—*John A. Stevenson.*

1855. BRUNER, S. C. **La pudrición negra del cacao.** [Black rot of cacao.] Informe An. Estac. Exp. Agron. [Cuba] 1918–20: 627–628. *1 fig.* 1920.—The black rot disease of cacao due to *Phytophthora faberi* has been found in Cuba. Symptoms of the disease are briefly described.—*John A. Stevenson.*

1856. BRUNER, S. C. **Lista preliminar de las enfermedades de las plantas de importancia economica para Cuba.** [Preliminary list of the diseases of economic plants of Cuba.] Informe An. Estac. Exp. Agron. [Cuba] 1918–20: 723–755. *47 fig.* 1920.—A list is presented of the diseases of economic plants of Cuba with brief descriptive notes as to symptoms and occurrence.—*John A. Stevenson.*

1857. DOIDGE, E. M. **Crown gall. Bacterium tumefaciens Smith and Townsend.** Jour. Dept. Agric. Union of South Africa 3: 64–67. *1 fig.* 1921.—This is a popular account of the occurrence of crown gall in South Africa.—*E. M. Doidge.*

1858. FAWCETT, G. L. **Enfermedad del cacao.** [Cacao disease.] Rev. Indust. y Agric. Tucuman 10: 52–54. 1920.—A disease of cacao reported from Ecuador is apparently due to *Phytophthora faberi*. Symptoms and recommended treatment are outlined.—*John A.* Stevenson.

1859. FAWCETT, G. L. **La verruga o "scab" de los citrus.** [Citrus scab.] Rev. Indust. y Agric. Tucuman 10: 124–128. *3 fig.* 1920.—Citrus scab, caused by *Cladosporium citri,* made its first appearance in Tucuman in 1918–19. The disease has also been reported from Paraguay by Spegazzini. The symptoms of the disease and control measures are discussed. The grapefruit is severely attacked.—*John A. Stevenson.*

1860. FROMME, F. D. **Wildfire and angular spot.** Rhodesia Agric. Jour. 18: 411–414. 1921.—This is evidently a reprint and is preceded by a note by H. W. TAYLOR to the effect that both diseases occur in Rhodesia.—*E. M. Doidge.*

1861. MIURI, M. **Diseases of important economic plants in Manchuria.** [In Japanese.] Bull. South Manchuria Railway Company Agric. Exp. Sta. [Kun-chu-ling, Manchuria] 21, *56 p., 8 fig.* 1921.—Brief descriptions of the cause, symptoms, and control of the diseases of soybean, sorghum, maize, and Italian millet are given. (1) On soybean, bacterial blight (*Bacterium sojae* Tisdale?), downy mildew (*Peronospora trifolium* var. *manshurica* Naoum.), sclerotinia rot (*Sclerotinia libertiana*), ring spot (*Fusarium* sp.), silk rot (*Hypochnus centrifugus*), rust (*Uromyces sojae*), gray spot (*Pleosphaerulina sojaecola* (Massl.) Miura nov. nom.), brown spot (*Septoria glycines*), leaf spot (*Cercospora daizu* M. Miura n. sp.), yellows (*Heterodera schachtii*), soil sickness, and dodder (*Cuscuta chinensis*); (2) on sorghum, stalk rot (*Pythium debaryanum*), head smut (*Sphacelotheca reiliana*), grain smut (*Sphacelotheca sorghi*), leaf spot (**Ramulispora** *andrapogonis* Miuri n.g. et n. sp.); (3) on maize, stalk rot (*Pythium debaryanum*), head smut (*Sphacelotheca*), smut (*Ustilago zeae*); (4) on Italian millet, downy mildew (*Sclerospora graminicola*), smut (*Ustilago crameri*), rust (*Uromyces setariae-italicae*), damping-off (*Fusarium* sp.). The new genus and the new species are fully described and figured.—*S. Hori.*

1862. PUTTERILL, V. A. **Plant diseases in the Western Province.** Jour. Dept. Agric. Union of South Africa 2: 525–532. *4 fig.* 1921.—Chlorosis in Kelsey plums at Wellington in the Cape Province appears to be due to a general lack of plant foods and humus in the soil. Notes are also given on Lithiiasis in pears, chrysanthemum rust (*Puccinia chrysanthemi*), and a storage rot of soft fruits caused by *Rhizopus nigricans.*—*E. M. Doidge.*

1863. RAMIRÉZ, ROMÁN. **Cyathus de la vid.** [A Cyathus on grape.] Rev. Agric. [Mexico] 5: 720. 1921.—*Cyathus* sp. is mentioned.—*J. A. Stevenson.*

1864. RAMIRÉZ, ROMAN. **Enfermedad de las dahlias.** [A dahlia disease.] Rev. Agric. [Mexico] 6: 100. 1921.—*Oidium* sp. is mentioned.—*J. A. Stevenson.*

1865. Ritzema Bos, J. **Trametes Pini Brot. (Fr.) een voor de dennen hoogst gevaarlijke zwam, thans ook in Nederland aangetroffen. [Trametes pini, a fungus very dangerous to the fir, now present in Holland.]** Tijdschr. Plantenz. 26: 189–192. 1920.—The author records the recent discovery of this fungus in Holland and describes the character of the injury to the host.—*H. H. Whetzel.*

1866. Schoevers, T. A. C. **Nieuwe ziekten, waarop gelet moet worden. [New diseases to which attention should be given.]** Tijdschr. Plantenz. 26: 208–211. 1920.—The discovery in Holland of the disease of beans caused by *Isariopsis griseola* is recorded.—*H. H. Whetzel.*

1867. South, F. W. **Short report on the work of the inspection staff, second half-year, 1920.** Agric. Bull. Federated Malay States 8: 256–258. 1920 [1921].—During the dry weather of the 3rd quarter of 1920 moldy-rot disease on the rubber tree (*Sphaeronema fimbriatum*) became less abundant and in some places disappeared. A dying-back of the edge of the tapping cut on trees of *Hevea brasiliensis*, as well as a decay of the renewing bark, of obscure cause, was observed. *Ustulina zonata* was observed on *Areca catechu.*—*I. H. Burkill.*

THE PATHOGENE (BIOLOGY; INFECTION PHENOMENA; DISPERSAL)

1868. Büsgen, M. **Omnivorie und Spezialisation bei parasitischen Pilzen. [Omnivorousness and specialization among parasitic fungi.]** Zeitschr. Forst- u. Jagdw. 51: 144–153. 1919. —Specialization by parasites is said to be the resultant of the individual capability of the parasite and the nature of the host plant. It is first manifested in the ability of the fungus to penetrate the cell-wall, which offers the first resistance. *Botrytis vulgaris*, a very important destroyer of forest trees, decomposes cellulose readily, but it is limited as to its ability to break down the cell structure of various plants. Once it breaks through the cell structure it is omnivorous. The poison from the fungus, which is not oxalic acid, brings about loss of turgor, and death, and separation of cells. Plants immune to infection usually have leaves with smooth, shiny, waxy epidermis.—*J. Roeser.*

1869. Harter, L. L., and J. L. Weimer. **Studies in the physiology of parasitism with special reference to the secretion of pectinase by Rhizopus tritici.** Jour. Agric. Res. 21: 609–625. 1921.—*Rhizopus tritici* acts in advance of its growth in sweet potato [*Ipomoea*], causing a dissolution of the cells. The fungus produces a powerful intracellular and extracellular enzyme, pectinase, when grown in sweet potato decoction. The maximum enzyme content of the hyphae and of the nutrient solution is attained in cultures about 24 and 48 hours old, respectively. The extracted enzyme effects complete maceration of raw sweet-potato discs. It acts most rapidly at temperatures between 45 and 55°C.; below 45°C., its action decreases directly with the temperature. The enzyme is inactivated at 60°C., and is slightly deactivated by centrifuging to remove sand and fungous debris, and by filtering the solution—in which powdered hyphae and sand are suspended—through filter paper. Exposure of the fungus hyphae to direct sunlight for 2 hours does not affect the macerating power. The enzyme is not affected by toluol (when used as a disinfectant), by washing in water for 15 minutes, or by treating with acetone for 12 minutes followed by ether for 3 minutes.—*D. Reddick.*

1870. Turesson, Göte. **Mykologiska Notiser II. [Fusarium viticola Thüm infecting peas.]** Bot. Notiser 1920: 113–125. *Fig. 1.* 1920.—A severe infection appeared in 1918 at the experimental station at Svalöv, Sweden. The varieties of peas attacked most severely in 1918 were: Non plus Ultra and Stensärt; less so Gradus, Non Pareil, and Champion of England.—Mycelium was found in fissures of the stem. When transferred to culture media, *Aspergillus*, *Penicillium*, *Cladosporium*, *Macrosporium*, and *Fusarium viticola* Thümen were isolated. The inoculations with *Cladosporium* and *Macrosporium* yielded negative results. Peas were germinated in moist sawdust at a temperature of 15–18°C., the following field-peas being used: Concordia, Gröpärt, Soloärt; and of garden peas the marrowfats Non plus Ultra, Stensärt, and Champion of England. The results of 3 kinds of inoculation were as follows: (1) Soil-infection gave positive results in all varieties, some garden-peas (Stensärt, Champion

of England) being more readily infected under laboratory conditions than others. The root-system became infected and developed but poorly. (2) Stem-inoculation produced infection readily in the garden-peas when a mycelium-containing medium was applied to artificially produced wounds on the stem, less readily when stems were intact. Infection did not follow when mycelium alone was used on intact stems. Garden-peas seem to be more susceptible than the field varieties, with the exception of Gröpärt, which readily became infected. (3) With seed inoculation infection followed most readily when seed were inoculated and then germinated.—As only 2–3 per cent of the seed taken from badly infected fields show infection, soil infection is the only one considered important. Proper rotation of crops is suggested as the most practical means of eradicating the disease.—*P. A. Rydberg.*

THE HOST (RESISTANCE; SUSCEPTIBILITY; MORBID ANATOMY AND PHYSIOLOGY)

1871. Beauverie, J. **La résistance plastidaire et mitochondriale. Esquisse d'une méthode applicable à l'étude du parasitisme et des maladies des plantes. [The resistance of plastids and mitochondria. An outline of a method applicable to the study of parasitism and the diseases of plants.]** Rev. Auvergne 38: *16* p. *Pl. 1.* 1921.—The author develops further the facts stated in a former article (see Bot. Absts. 10, Entry 444). The chondriosomes and plastids possess a resistance which varies with the age of the tissues, it being weaker for the meristem than for the older tissues. It perhaps varies with the species, and is diminished by the presence of a parasite, such as a fungus. This increased weakness under the action of a parasite has been the subject of only a very small number of experiments. The reagents which serve to demonstrate the resistance or susceptibility of the organisms may be distilled water, hypotonic solutions, etc., but the chloroplasts are particularly resistant to their action and the author has been lead to search for a reagent capable of attacking them. This he has found in saponin solution. A solution of 1/1000 acting on a leaf of *Ficaria ranunculoides* parasitized by *Uromyces ficaria* has little effect on the chondrioplastids of healthy tissue, but the action becomes more marked toward the infected zone, where it produces chondriolysis. The author suggests what might be the applications of these facts for studying the intricate mechanism of parasitism, if later studies develop and generalize than: Determining the relative resistance of varieties or even of individuals (for stocks of pedigreed lines) by a preliminary test of the plastidial solidity; study of filterable virus diseases; etc.—*J. Beauverie.*

1872. Rao, P. S. Jivanna. **Physiological anatomy of the spiked leaf in sandal.** Indian Forest. 47: 351–360. *Pl. 11–12.* 1921.—Spiked leaves have 6 or 7 lines of mesophyll cells packed so closely as to leave no air spaces toward the lower surface. In young leaves the cells in the sheath around the vascular bundles and their ramifications are filled with starch. Older leaves show starch in the central cells and finally throughout the mesophyll. The cells of the lower epidermis also become filled with starch in the later stages.—Starch increases in amount progressively from the youngest to the oldest leaves, but disappears in the advanced stages of the disease, when the plant is dying.—*E. N. Munns.*

1873. Weimer, J. L., and L. L. Harter. **Respiration and carbohydrate changes produced in sweet potatoes by Rhizopus tritici.** Jour. Agric. Res. 21: 627–635. 1921.—The relative amounts of carbon dioxide given off from 2 halves of the same sweet potato [*Ipomoea*], 1 of which was inoculated with *Rhizopus tritici*, were determined. The fungus usually caused complete decay of the inoculated half in 3 days. From 6.3 to 7.8 times as much carbon dioxide was given off from the inoculated half as from the healthy half. Analyses at the end showed smaller amounts of starch, cane sugar, and reducing sugars in the decayed samples than in the healthy ones. The total quantity of carbohydrates lost in the decayed samples was greater than is indicated by the amount of carbon dioxide given off, which suggests that carbohydrates were used in other processes, such as production of fungous material, alcohol, acids, etc. Tests with sterilized tissue showed a similar reduction of carbohydrates by the fungus.—The fungus grows in Czapek's nutrient solution plus glucose, but makes practically no growth when cane sugar is the only source of carbon. When the 2 sugars are used together cane sugar only is reduced.—*D. Reddick.*

1874. Weimer, J. L., and L. L. Harter. **Wound-cork formation in the sweet potato.** Jour. Agric. Res. 21: 637–647. 1921.—Under favorable conditions a cork-layer forms over wounds of the sweet potato (*Ipomoea batatis*). The production of this layer is preceded by the formation of a layer of starch-free cells, usually 3–10 cells deep, beneath the injured surface. Septa begin to appear from the 2nd to the 3rd day, and after 4–6 days a distinct layer of cork cells covers the wound. The process takes place between 19.5 and 33°C., the optimum being 33°. High humidity, 95–100 per cent, is favorable for cork formation; lower limits are not reported. The conditions existing in the storage house did not permit of the formation of a well developed cork-layer, but a hard, dry surface covering did develop through which infection by artificial means could not be secured. The healed surface of a wounded sweet potato also forms a fairly efficient barrier against infection by microorganisms.—*D. Reddick.*

DESCRIPTIVE PLANT PATHOLOGY

1875. Aoi, K. **Reddish coloration of polished rice caused by Oospora sp.** [In Japanese.] Bull. Imp. Cent. Agric. Exp. Sta. [Nisbigahara, Tokyo, Japan] 45[1]: 29–69. *Pl. 1–3.* 1921.—In north Japan, polished rice, imperfectly dried, frequently becomes purplish red in storage. Various molds and bacteria were isolated from such rice discolored during tbe summer of 1917 at Sakata, Yamagata, Japan, a large rice distributing town in the north. Infection experiments with pure cultures of the isolated organisms on sterilized polished rice demonstrated that *Oospora* sp. is responsible for the discoloration. When sterilized polished rice containing 18 per cent water is inoculated with this species and left 4–7 days at 25°C., the discoloration appears. Morphologically the fungus is comparatively simple, the differentiation of fertile, nutritive, and vegetative hyphae being rather obscure. The nutritive (long) hyphae, found chiefly in the medium, are divided by septa into numerous segments. The vegetative hyphae grow almost exclusively on the surface of the medium and multiply by budding to form yeast-like colonies on the surface of the culture medium. Fertile hyphae arise from various segments and form conidia. Conidia are also produced by budding on the free ends and sides of nutritive hyphae. The mature conidia are short, elliptical, 3–5μ in diameter, and contain usually 1–10 refringent oil globules; germination is by budding. When the fungus is grown on polished rice containing less than 19.6 per cent water, it assumes a purplish red color; but on rice containing more water it becomes dark or even black in color. No pigment can be extracted by water, alcohol, ether, benzene, benzine, or other ordinary solvents. The purplish coloration is changed to reddish purple by alkaline solutions, and restored by acids. By reduction with nascent hydrogen the color soon disappears. On cooked rice (Japanese "Meshi") and on culture media, the colonies assume first a yellow color, but gradually turn dark or black. Temperature limits of growth are 11 and 35°C., the optimum being about 25°. The minimum water content of rice which permits fungus growth is about 15.5 per cent. On sound, unpolished rice the fungus does not grow, and on polished rice having a water content less than 20 per cent growth is slight. Conidia of the fungus were killed by several hours' exposure to direct sunlight in summer, and by 48 hours exposure to air saturated with carbon bisulphide. But in lower concentrations, viz., 4 pounds carbon bisulphide per 1000 cubic feet, growth was only partially retarded.—*S. Hori.*

1876. Beach, W. S. **The lettuce drop due to Sclerotinia minor.** Pennsylvania Agric. Exp. Sta. Bull. 165. *27 p., 3 pl., 3 fig.* 1921.—Part I contains a historical review of this disease, which is similar to that caused by *S. libertiana* though differing from the latter in that the sclerotia are much smaller and form crusts on the under surfaces of the lower leaves. Meteorological and environmental relationships show that the disease occurs under a wider range of environments than *S. libertiana* and therefore appears more regularly in localities where both diseases are established. However, it appears to be more restricted in its distribution than *S. libertiana*, apparently on account of its failure to form mature ascospores under ordinary field conditions.—Celery is attacked during the blanching process, but shows considerable resistance, a 5 per cent loss being the maximum recorded. The fungus has also been found on *Portulaca oleracea*, *Verbascum blattaria*, and *Sisymbrium officinale*, which shows that it may have numerous host plants. Inoculations of beets and carrots in winter

storage failed to show pronounced infection.—Crop rotation is important in control. Resistant crops should be grown upon infested soil for at least 2 successive years. Sanitation in the field and packing shed reduces the amount of soil infestation, and clean cultivation, especially the destruction of weeds which harbor the parasite, is advisable. Soil sterilization with various chemicals was tried in 1919 and 1920 without conclusive results, though copper sulphate solution and formaldehyde, both hot and cold, are promising. Bordeaux mixture applied as a drench, crude sulphuric acid followed by lime, cresol, and cyanamid effected little, if any, control.—Of the 3 varieties of lettuce tested under the same conditions, All Heart, a low, flat-headed variety, showed 40 per cent infection; Wonderful, with a medium upright head, showed 16 per cent; and Paris Cos, an upright form, showed 13 per cent infection. It is believed that the differences in amount of infection are explained on the basis of habit of growth.—In part II studies upon cultural and morphological phases are considered. *S. minor* grows well in ordinary culture media, forming sclerotia in heavy crusts. Sclerotia planted in tumblers of sand in September began germination in March, but normal development of apothecia occurred only in a cold frame from March to May. The apothecia are smaller, the asci and the ascospores larger, than those of *S. libertiana*. Apothecia in nature have not been observed by the author.—Direct infection of lettuce leaves by ascospores was not successful, indicating that a preliminary saprophytic development is necessary.—*C. R. Orton.*

1877. Dana, B. F. **Two new Sclerotinia diseases.** Phytopathology 11: 226–228. *Pl. 8.* 1921.—A leaf blight and fruit rot of *Amelanchier cusickii* has been observed in Washington state. The leaves are attacked and killed early in the spring, conidia of the *Monilia* type being produced. Later the fruits are attacked, drying up and hanging on the trees until fall. The following spring apothecia of a Sclerotinia are produced in abundance on overwintered fruits under trees where the disease has appeared. This fungus is described as *Sclerotinia gregaria* n. sp., and is considered the perfect stage of the Monilia which attacks the leaves and fruit.—A very similar disease was found on the young leaves, twigs, and half grown fruits of *Prunus demissa*. Conidia of the Monilia type were produced in abundance on the leaves and twigs, but none have been found on the fruits. Apothecia developed in early spring on the overwintered fruits on the ground. This fungus is described as *Sclerotinia demissa* n. sp., and a technical description is appended. The genetic connection of the conidial and the ascigerous stages has not been demonstrated by cultures in either case.—*B. B. Higgins.*

1878. Davis, W. H. **Mammoth clover rust.** Proc. Iowa Acad. Sci. 26: 249-257. 1919. Stages of the rust are described and photographs and line-drawings of spores and sori are given. "The causal organism is probably *Uromyces trifolii.*"—*H. S. Conard.*

1879. Fawcett, G. L. **La enfermedad de las rayas amarillas de la caña.** [**Yellow stripe disease of cane.**] Rev. Indust. y Agric. Tucuman 10: 46–48. 1919.—The yellow stripe disease of sugar cane is widely distributed on Java varieties in Tucuman. Variety Kavangire is immune and D 1135 is very resistant. The writer does not consider the disease serious.—*John A. Stevenson.*

1880. Gardner, Max W., and James B. Kendrick. **Soybean mosaic.** Jour. Agric. Res. 22: 111–113. *Pl. 18–19.* 1921.—Soybean [*Soja Max*], variety Hollybrook, was found affected with a typical mosaic disease at Lafayette, Indiana. The disease is communicable by rubbing and by inoculation of wounds with expressed juice. The incubation period varied in the tests from 13 to 37 days. Fruiting of affected plants is greatly reduced, and most of the seeds are rendered sterile. The viable seeds are undersized; such seeds transmit the disease to the extent of 13 per cent. The disease has not been communicated to garden bean [*Phaseolus vulgaris*] nor to cowpea [*Vigna sinensis*].—*D. Reddick.*

1881. Gardner, Max W., and James B. Kendrick. **Turnip mosaic.** Jour. Agric. Res. 22: 123. *Pl. 20.* 1921.—Turnip [*Brassica rapa*] was found affected with a typical mosaic disease at South Bend, Indiana. The disease is communicable by rubbing and by inoculation

of wounds with expressed juice. The incubation period in January was 16 days. Radish [*Raphanus sativus*] is not affected and is not a "carrier." [See also Bot. Absts. 10, Entry 1888.] —*D. Reddick.*

1882. HUBERT, ERNEST E. **Notes on sap stain fungi.** Phytopathology 11: 214–224. *Pl. 7, fig. 1–4.* 1921.—Two types of wood stain due to fungi were studied. A grayish-olive discoloration due to *Lasiosphaeria pezizula* was observed in timbers of beech (*Fagus grandifolia*), red gum, and persimmon (*Diospyros virginiana*). The discoloration is due to massing of the olivaceous hyphae, which are most abundant in and near the medullary ray cells. These cells are modified to some extent, but no distinct decomposition of the cell wall was observed.—The 2nd type studied was a grayish-blue staining of various coniferous and hardwood timbers by *Ceratostomella* sp. The staining is confined almost entirely to sap-wood. The hyphae are able to penetrate the cell walls, though they usually pass through the pits. The enzymes which decompose the wood seem to be confined to the tips of young hyphae. The vessel walls are not noticeably decomposed, but the walls of the ray cells are often so decomposed as probably to produce a slight weakening of the timber.—In both types the discoloration may mask the attacks of other more serious wood-destroying fungi.—*B. B. Higgins.*

1883. LEENDERTZ, C. J. **Een Botrytis-ziekte op roode bessen en rabarber. [A Botrytis disease of red currants and rhubarb.]** Tijdschr. Plantenz. 26: 173–175. 1920.—This disease affects primarily the leaf margins, which turn yellow and die; if plants are attacked when young dwarfing occurs. Shoots of affected plants make a weak growth. Sclerotia are formed on the leafless shoots, especially at leaf scars. These sclerotia after overwintering produce conidiophores and conidia in the spring. Winter spraying with carbolineum and summer applications of Bordeaux mixture are suggested as means of control. The Botrytis disease of rhubarb, which followed cold weather in 1920, causes wilting of leaves and petioles. Conidiophores develop abundantly on all parts of the leaf. Complete removal of all leaves at time of pulling and trimming is suggested as the most practical control measure; spraying with Bordeaux mixture is also suggested.—*H. H. Whetzel.*

1884. MIZUSAWA, I. **A bacterial rot of the saffron crocus.** (In Japanese.) Bull. Kanagawa Prefecture Agric. Exp. Sta. 51. *29 p., 4 pl.* 1921.—In Kanagawa Prefecture an injurious disease has gradually spread since 1916–1917 in the fields of saffron crocus (*Crocus sativus*), cultivated for medicinal purposes. The disease shows 2 symptoms: (1) In November, a basal soft rot affects the leaves, causing them to become yellow and easily detachable from the bulb, which later may either rot completely or produce numerous leaf buds; (2) the most common type of the disease appears first in middle December. A yellowish color begins at the leaf-tips and spreads until the entire leaves become yellow and finally die the following January or February; this is due to slow rotting of roots and bulb. Repeated inoculation experiments on disinfected leaves and bulbs demonstrated that *Bacillus croci* sp. nov. is the causal organism. The following characters are given: A short cylindrical rod with rounded ends, solitary or rarely in pairs, 3.2–1.2 × 1.1–0.6μ, actively motile by 2–4 peripherical cilia which are 8–10, often 15μ, long; no spores or capsules distinguished; Gram negative; growth on agar milky-white, moist, smooth, and glistening, later wrinkled and diminished in luster; optimum temperature 25–28°C., thermal death point 55°C. (10 minutes); reduces methylene blue; reduces nitrates to nitrites; produces no indol or ammonia; does not produce hydrogen sulphide; coagulates milk; liquifies gelatin but not mannan; facultatively anaerobic; renders neutral bouillon gradually alkaline; produces no gas or pigments; grows luxuriantly in a medium containing various kinds of sugar (except cane sugar); best growth in acid media, meager in alkaline; pathogenic to *Crocus sativus* L.; infectious without incisions to narcissus hyacinth, with incisions to purple crocus, onion (*Allium cepa*), and Welsh onion *A.* (*fistulosum*); Group number 221.2233032. Laboratory experiments show that the organism is very susceptible to alkaline disinfectants, and resistant to acid. It is killed by a few minutes' exposure to lime water. The author suggests that applying lime to the field and soaking seed bulbs in lime water should therefore be effective for control of the disease.—*S. Hori.*

1885. Quanjer, H. M., en J. O. Botjes. **L'enroulement des feuilles (leptonecrose) et la frisolée (mosaique) de la pomme de terre. [Leaf-roll and curly dwarf potato.]** Ann. Sci. Agron. Française et Etrangère 36: 262–280. 1919.—Phloem-necrosis (leaf-roll) and mosaic (including curly dwarf) are entirely similar in their mode of propagation. Infection does not arise from the soil.—Botjes is credited with the discovery of the method of dispersal in the field and of the method of culture to free stock from disease. Quanjer discovered phloem-necrosis in 1908 and described it in 1913 after being convinced of its diagnostic value for detecting leaf-roll. Leaf-roll, or phloem-necrosis, is contagious and pseudo-hereditary, characteristics which enable it to be distinguished from temporary leaf-roll caused by soil influences. It is also characterized by necrosis of the phloem bundles, thus differentiating it from diseases of the woody vessels. Plants inoculated with the mosaic virus show the first symptoms of mosaic in their offspring, and in the 2nd or later generations an aggravated form of curly dwarf appears. The 2 diseases are similar in that they are scarcely discernible in the year in which infection occurs. In general, phloem-necrosis develops more rapidly in succeeding generations than does mosaic.—Contagiousness of the 2 diseases was proved by grafting diseased tubers on sound ones. Pot experiments in which diseased and sound tubers were in some cases planted together, in others separated, and in which the tops of the plants were or were not separated by glass, have shown that in general the diseases are carried through the soil, only rarely through the air. Botjes' observations tend to show that the phloem-necrosis organism does not winter as a saprophyte in the soil, but is carried by the tubers, and that cases of contagion attributed to soil are due to carriage of the virus—limited to a distance of about 20 m. Inasmuch as the organic union of roots is not verified, it is possible that the virus may live for some time in the soil. Whether root wounds are necessary for infection has not been ascertained.—Experiments show that mosaic passes from tobacco to tomato, and reciprocally, and from tomato to potato, but not from tobacco to potato.—Starch-staining experiments show that the virus of mosaic and similar maladies ascends with the sap and that the infectious matter of phloem-necrosis is carried by the phloem. The so-called senility of certain potato varieties is explained by the fact that these 2 diseases, considered as symptoms of degeneration, and propagated by means of tubers, become intensified with long culture. It is possible that the virus adapts itself gradually to varieties which are at first very resistant.—The basic principle of control methods is the use of an isolated plot for seed production and careful inspection of growing plants.—*A. B. Beaumont.*

1886. Ramirez, Román. **El chahuixtle rojo del frijol. [Rust of the bean.]** Rev. Agric. [Mexico] 5: 830. 1921.—This is an account of *Uromyces appendiculatus* on the common bean.—*J. A. Stevenson.*

1887. Schultz, E. F. **La "Rhizoctonia violacea" en los alfalfares de Tucuman. [Rhizoctonia violacea in the alfalfa fields of Tucuman.]** Rev. Indust. y Agric. Tucuman 10: 154–162. *4 fig.* 1920.—The short duration of alfalfa fields in Tucuman (3–5 years) is generally attributed to weeds, such as *Cynodon dactylon* and *Holcus halepensis*. Weeds, however, are easily controlled. Other causes are tramping by cattle in wet seasons, excessive moisture, poor drainage, lack of lime on acid soils, over-cutting, and over-pasturing. The greatest losses, however, are due to *Rhizoctonia violacea*, which attacks the main root 2–3 inches underground. The factors given above all tend to weaken the host plants and bring about fungus attacks. Diseased plants turn yellow and finally die, leaving bare spots, which soon are occupied by weeds. Other crop plants are susceptible and sweet potatoes in particular should not be used in rotation with alfalfa. The disease can be controlled by careful preparation of the soil, liming, and soil inoculation with legume bacteria. Other crops should not be interplanted with alfalfa.—*John A. Stevenson.*

1888. Schultz, E. S. **A transmissible mosaic disease of Chinese cabbage, mustard and turnip.** Jour. Agric. Res. 22: 173–177. *Pl. B (colored) and 22–23.* 1921.—Chinese cabbage (*Brassica pekinensis*), mustard (*B. japonica*), and turnip (*B. rapa*) are affected with a typical mosaic disease. The disease is readily communicated from one plant to another and from one species to another, both by artificial inoculation and by natural inoculation with the aphis

Myzus persicae. The insect alone produces no symptom of mosaic. The disease is different from mosaic of potato. Tests with turnip show that seminal transmission does not occur. [See also Bot. Absts. 10, Entry 1881.]—*D. Reddick.*

1889. TAKIMOTO, K. **On a bacterial leaf-spot of Antirrhinum majus L. [In Japanese.]** Bot. Mag. [Tokyo] *34: 253–257. 1920.*—A new leaf-spot disease on snapdragon, cultivated in the field of the Korean Government Agricultural Experiment Station, has been observed since 1918. As a result of repeated inoculation experiments the author ascribes the disease to a yellow organism which he names *Pseudomonas antirrhini* sp. nov., and which he describes as follows: Cylindrical rod with rounded ends, solitary or in pairs, 0.8–1.2 × 0.3–0.4μ, motile by 1–4, usually 2, unipolar cilia 3.5–4μ long; no capsules or endospores found; Gram negative; growth on agar pale at first, yellow later; liquifies gelatin; separates the casein from milk and gradually digests it, the culture becoming greenish yellow with age; does not produce gas or indol; slightly reduces methylene blue; reduces nitrates to nitrites; aerobic; thermal death point about 51°C.; occurs on *Antirrhinum majus*.—For control, the author recommends rotation and 1 or 2 sprayings with Bordeaux mixture.—*S. Hori.*

1890. TISDALE, W. H. **Two Sclerotium diseases of rice.** Jour. Agric. Res. 21: 649–657. *Pl. 122–126.* 1921.—*Sclerotium rolfsii* is the cause of a seedling blight of rice [*Oryza*] in Louisiana. Blighted seedlings appear in small areas, and frequently follow the drill rows. Sclerotia are abundant on dead roots and bases of stems. Inoculations made on Honduras rice with *S. rolfsii* from rice, soybean [*Soja*], *Arrhenatherum elatius*, and wheat [*Triticum*], show that the fungus from rice and wheat is much more virulent than that from tall oat grass and particularly than that from soy bean. In the experiments affected plants continued to die until irrigation water was applied, after which all plants not too severely damaged recovered.—Sclerotia of the fungus persist for at least 9 months, and submerged in water for at least 5 months. The sclerotia float on water and are thus easily dispersed. The fungus grows vigorously as a saprophyte.—*Sclerotium oryzae* causes a stemrot of rice in Louisiana. The leaf sheath is apparently attacked first, especially after irrigation water is applied. Subsequently the stems are attacked and almost completely destroyed. Lodging follows and the panicles do not fill well. The fungus produced infection when introduced into wounds on Honduras rice. The variety Early Prolific is especially susceptible; Japanese varieties are more resistant.—*D. Reddick.*

1891. WAHL, VON. **Schädlinge an der Sojabohne. [Insect pests of the soybean.]** Zeitschr. Pflanzenkrankh. 31: 194–196. 1921.—The principal insect pests are described, and several fungus diseases are incidentally mentioned.—*H. T. Güssow.*

ERADICATION AND CONTROL MEASURES

1892. ANONYMOUS. **Bestrijding van de aardappelziekte. [Combating potato blight.]** Tijdschr. Plantenz. 26: 172. 1920.—This is a brief warning against an early outbreak of late blight sent out by the phytopathological service. Infection is chiefly on the stalks, but following the current dry spell serious spread of the fungus to the foliage is to be expected. Spraying is urged.—*H. H. Whetzel.*

1893. ANONYMOUS. **La siembra del trigo y los tratamientos de la semilla. [Wheat seeding and seed treatment.]** Defensa Agric. [Uruguay] 2: 89–98. *12 fig.* 1921.—The bunt disease (*Tilletia*) of wheat is described, and seed treatment with copper sulphate or formaldehyde is recommended.—*John A. Stevenson.*

1894. BIANCHI, ANGEL T. **Enfermedades de la papa. [Potato diseases.]** Surco [Argentina] 1⁶: 8–9. 1921.—Dry rot (*Fusarium solani*) and wet rot (*Phytophthora infestans*) are discussed and control measures outlined. [See also Bot. Absts. 9, Entry 920.]—*John A. Stevenson.*

1895. GIDDINGS, N. J. **Orchard dusting versus spraying.** Jour. Econ. Entomol. 14: 225–230. 1921.—Sulphur dust for control of peach scab (*Cladosporium carpophilum*) in West Virginia averaged a little better than liquid sprays. Brown rot (*Sclerotinia cinerea*) data are inadequate because of light infection. Foliage injury resulted only when excessive amounts of material were used. Comparison of copper-lime and sulphur dusts with Bordeaux and lime-sulphur sprays for control of apple scab (*Venturia pomi*) showed that dusts are not so effective as sprays where the disease is severe. The author believes that for rapid progress of dusting the "cooperation of chemistry, pbysiology, entomology, and horticulture" is necessary, and that negative evidence as well as positive data should be published in order that commercial orchardists may not be unduly influenced and suffer extreme losses. [See also Bot. Absts. 10, Entries 1896, 1897, 1899.]—*J. E. Kotila.*

1896. HEADLEE, T. J. **Dusting as a means of controlling injurious insects.** Jour. Econ. Entomol. 14: 214–220. 1921.—In 3 years' experimentation sulpho-arsenical lime dusts were found practically as effective as self-boiled lime-sulphur and lead arsenate applied as liquid spray for control of insects and diseases of peach. For control of insects and diseases of apple in New Jersey, dusts were not found equivalent in any way to liquid sprays. Experiments in 1920 showed that 90–10 dust impregnated with 1 per cent nicotine is as effective as dust with 3 per cent nicotine, and only a little more than ½ as effective as liquid treatment (⅜ pint nicotine to 50 gallons) for control of leafhopper. "Although recently hatched aphids were more efficiently killed by liquid treatments, 90–10 dust impregnated with 1 per cent or more of nicotine caused very material execution." [See also Bot. Absts. 10, Entries 1895, 1897, 1899.]—*J. E. Kotila.*

1897. PARROTT, P. J. **Control of sucking insects with dusting mixtures.** Jour. Econ. Entomol. 14: 206–214. 1921.—Redbugs were found to be very sensitive to nicotine dusts. No difference was found between 0.5 and 1 per cent nicotine dusts. For apple and currant aphis, dusting compared quite favorably with liquid sprays. Mixtures carrying less than 2 per cent nicotine gave very poor control of potato aphis. Nymphs of apple leafhopper were very susceptible to dusts containing 0.5 and 1 per cent nicotine, and 80 per cent of nymphs of the grape leafhopper were destroyed by dehydrated copper-sulphate and lime containing 2 per cent nicotine. Four-lined plant bug nymphs were much more resistant than apple redbug, but dusts with 2 per cent nicotine caused complete paralysis. The degree of susceptibility varied with different species. Density of foliage was found to be a greater factor in obtaining control by dusting than was the case with spraying. [See also Bot. Absts. 10, Entries 1895, 1896, 1899.]—*J. E. Kotila.*

1898. PUIG, JUAN. **Los parasitos vegetales y animales de las plantas cultivadas y espontaneas observados en la Republica Oriental del Uruguay. [Animal and vegetable parasites of cultivated and native plants in Uruguay.]** Inspección Nacion. Ganaderia y Agric. [Uruguay] Bol. 36. *194 p., 62 fig.* 1919.—General directions are given for the control of the more important insect pests and diseases of the crop plants of Uruguay. A list of insects and plant diseases collected by the author is included.—*John A. Stevenson.*

1899. QUAINTANCE, A. L. **Dusting versus spraying of apples.** Jour. Econ. Entomol. 14: 220–225. 1921.—Data obtained in Michigan, Virginia, Arkansas, Connecticut, and Colorado are tabulated. In northern states where codling moth is not especially severe, dusting controls the insect practically as well as spraying. Further south dusting is not a satisfactory control measure. In arid regions, as in Colorado, dusting is notably less effective than spraying. Dusting compared favorably with spraying in control of plum curculio on apple where the insect was not especially abundant. [See also Bot. Absts. 10, Entries 1895, 1896, 1897.]—*J. E. Kotila.*

1900. RITZEMA BOS. J. **Bestrijding van de zoogenaamde "witte roest" der schorzeneeren, veroorzaakt door Cystopus tragopogonis (Persoon) Schroet. [Combating the so-called "white rust" of salsify caused by Cystopus tragopogonis.]** Tijdschr. Plantenz. 26: 216–220. 1920.—Following a brief description of the pathogene and its habits, the author presents the experi-

mental evidence on which he bases his conclusion that the most effective control of this disease is obtained by cutting away the leaves of the plant on the first appearance of the fungus and, later, as new leaves appear, by spraying 2 or 3 times during the season with Bordeaux mixture.—*H. H. Whetzel.*

1901. SLOGTEREN, E. VAN. **De nematoden-bestrijding in de bloembollenstreek. [Nematode control in the bulb district.]** Tijdschr. Plantenz. 26: 118–138, 161–171, 177–188. *Pl. 6, 7, and 11, fig. 1–3.* 1920.—The nematode (*Tylenchus devastatrix*) disease of narcissus presents 3 types of effects, corresponding to period of infestation: (1) Complete failure of leaf development (longest infestation); (2) production of twisted and speckled leaves (infested for 1 season); (3) production of flecks here and there on the blades (infestation of current year). Such flecks differ from ordinary leaf spots by being characteristically thickened or swollen instead of depressed. The effects of attack on the bulbs are described in detail, although they are chiefly internal and considered less reliable for diagnostic purposes than leaf lesions. —Evidence is presented that the parasite was introduced into Holland from England about 1909, and that it became of marked importance in 1916. The relation of this parasite to the nematode long known in Holland as the cause of "ring" or "old" disease of hyacinth is discussed, and an attempt made to decide on experimental evidence whether the nematodes are identical, 2 biological forms of the same species, or 2 distinct species. In the experiments, conducted in 2 series for 3 seasons, healthy narcissus and hyacinth bulbs were exposed under controlled conditions to nematodes from the 2 respective hosts. In no case did the nematode from narcissus attack hyacinth, or vice versa. *Amaryllis*, *Iseme*, and *Galanthus* (*Amaryllideae*), tested in similar cross-inoculation experiments, were attacked by the narcissus nematode only. Nematodes from naturally infested bulbs of these hosts were able to attack narcissus but not hyacinth bulbs. The conclusions are that this parasite of narcissus has not resulted from an adaptation *en masse* by the hyacinth nematode, that the narcissus form has not originated by mutation from the hyacinth form, that the nematode of narcissus is biologically distinct, and that, should morphological distinctions be discovered, specific names should be given to indicate the existence of distinct organisms.—The removal of diseased plants and immediately adjacent healthy ones, as well as replacement of the infested surface soil, is recommended. Chemicals failed to disinfect the soil, and heating appears too expensive for large scale application. Turning under the soil is of doubtful efficiency, since even the deepest and most careful spading does not entirely prevent infection. However, this method is recommended where replacement of the infested layer with clean soil is not feasible. Disinfecting bulbs by hot air and hot water treatments was tried, with promising results. The difficulty of maintaining uniform temperatures with large quantities of bulbs in the hot water treatment was overcome by means of a specially devised thermo-regulator, which is described and figured. In such treatments the size and condition of bulbs are important factors. The heating tends to hasten growth and blooming as well as bringing about control of the yellow disease (*Pseudomonas hyacinthi*).—*H. H. Whetzel.*

1902. VERHOEVEN, W. B. L. **Plantenziekten, waarmede rekening moet worden gehouden bij de veldkeuring. [Plant diseases which should be considered in field inspection.]** Tijdschr. Plantenz. 26: 149–159. *Pl. 8–10.* 1920.—Field characteristics of the common diseases of cereals and field legumes are briefly described, and the standard methods for control in each case given. The 1st part of the paper deals with cereal smuts and the stripe disease of barley. Rusts are not treated. Wheat affected with stinking smut is said to be more severely attacked by rusts than the non-smutted plants. Copper sulphate treatment is recommended for stinking smut of wheat and covered smut of barley, while for oat smut, hot-water treatment is preferred to formaldehyde. Where stinking smut and loose smut of wheat or the naked and covered smuts of barley occur together both copper sulphate and hot water treatment must be applied.—Bean anthracnose (*Colletotrichum lindemuthianum*), blight of peas (*Ascochyta pisi*), and clover anthracnose (*Colletotrichum* sp.) are discussed in the 2nd part of the article. The author recommends further investigation of several diseases, viz., *Gibberella* disease of oats, root rot of beets (*Phoma betae*), flax anthracnose (*Colletotrichum lini*), and mosaic disease of beans.—*H. H. Whetzel.*

MISCELLANEOUS (COGNATE RESEARCHES; TECHNIQUE; ETC.)

1903. PANTANELLI, E. **Sulla causa del mosaico nelle piante. [The cause of mosaic disease of plants.]** Boll. Mens. R. Staz. Patol. Veg. Roma 1: 40–41. 1920.—A mosaic disease of *Hypochaeris radicata* is produced following punctures by *Macrosiphon tussilaginis*. Only leaves on which the aphis is allowed to feed become mosaic.—The cause of mosaic diseases should be studied with reference to the exclusion of thrips and mites from the cultures.—*D. Reddick.*

1904. STRAND, E. [German rev. of: FRIEDERICHS, K. **Studien über Nashornkäfer als Schädlinge der Kokospalme. Bericht an das Reichs-Kolonialamt über eine 1913/14 im Auftrage ausgeführte Studienreise. (Studies of rhinoceros beetles as pests of the coco-palm. Report to the governmental colonial office upon an expedition undertaken on commission in 1913–14.)** *116 p., 20 pl., 1 map.* Berlin, 1919.] Arch. Naturgesch. Abt. A, 86^{11}: 166. 1920 [1921].

PHARMACOGNOSY AND PHARMACEUTICAL BOTANY

HEBER W. YOUNGKEN, *Editor*
E. N. GATHERCOAL, *Assistant Editor*

(See also in this issue Entries 1453, 1482, 1496, 1503, 1508, 1529, 1537, 1545, 1552, 1564, 1565, 1566, 1595, 1602, 1642, 1938, 1939, 1940, 2028)

1905. BEATH, O. A. **Chemical and pharmaceutical examination of the Woody Aster.** Wyoming Agric. Exp. Sta. Bull. 123. *41–66. Fig. 1–8.* 1920.—The bulletin, in 3 parts, deals with the poisonous properties of *Xylorrhiza parryi*. Part 1 is general in its scope, dealing with the distribution, animals effected, nature of the poison, and a review of the literature. Part 2 is concerned with the experimental methods employed. Part 3 gives the chemical and physical properties and describes the toxicity tests for the water-soluble, the amorphous, and the ether-soluble poisons which were extracted. A bibliography is given.—*James P. Poole.*

1906. BEATH, O. A. **Poisonous plants of Wyoming.** Wyoming Agric. Exp. Sta. Bull. 126· *35 p., 14 pl., 4 fig.* 1921.—A list of the principal poisonous plants of the range, occurring within the state, with the general location, period of activity, and the symptoms of and treatment for the poisoning caused by each of them. Each species is illustrated by a plate. A general introductory discussion covers contributory causes, types of poisonous plants, and preventive measures. The species included are: *Delphinium geyeri* Greene, *D. barbeyi* Huth, *D. menziesii* Nutt., *Lupinus argenteus* Pursh, *Zygadenus intermedius* Rydb., *Xylorrhiza parryi* Gray, *Cicuta vagans* Greene, *Triglochin maritima* L., *Aragallus albiflorus* A. Nels., *Astragalus mollissimus* Torr., *A. bisulcatus* (Hook.) Gray, *Asclepias speciosa* Torr., *Psoralea tenuiflora* Pursh, *Aconitum columbianum* Nutt.—*James P. Poole.*

1907. BEATH, O. A. **The chemical examination of the Silvery Lupine.** Wyoming Agric. Exp. Sta. Bull. 125. *101–114. Pl. 1–2, fig. 1–2.* 1920.—In Part 1 of this bulletin dealing with the poisonous properties of *Lupinus argenteus* Pursh., a description of the plant and its habitat, losses to stock, forage value and chemical constituents, and a summary of the literature are given. Part 2 deals with the experimental methods employed, including toxicity experiments, proximate analyses, estimation of crude alkaloids in the various parts of the plant, methods of extracting alkaloids in quantity, purification of alkaloids, isolation of a crystalline hydrochloride, and the properties of free bases with their effects on blood pressure, respiration, etc., on anaesthetized dogs. A bibliography is given.—*James P. Poole.*

1908. CASPERS, A. C. **De Noordwijksche Geneeskruindentuinen. [The medicinal herb gardens of Noordwijk.]** Weekbl. Bloembollencult. 31: 64. 1920.—A general discussion is given of growing medicinal plants in the vicinity of Noordwijk, Netherlands. Earlier this

was a center for growing medicinal herbs, but the industry was gradually replaced by bulb culture. The plants mainly grown are *Lappa major*, *Althaea officinalis*, *Datura Stramonium*, *Digitalis purpurea*, *Hysopus officinalis*, *Ruta graveolens*, *Thymus vulgaris*, *Salvia officinalis*, and *Cochlearia Armoracea*. Formerly the plants were dried in the open or in an attic; at present they are treated in a more scientific way, though each grower uses his own method.—*J. C. Th. Uphof.*

1909. Girola, Carlos D. **Plantas medicinales. Posibilidad del cultivo de las especies *exoticas* en Argentina. *Aprovechamiento de las especies indigenas.* [Medicinal plants, cultivation of exotic species, and utilization of indigenous species in Argentina.]** Bol. Ministerio Agric. Nacion. [Argentina] 25: 1–46. 1920.—The author outlines the history of the study of medicinal plants in Argentina. A list of plants that should be grown and studied is given. A plan (to include the cooperation of all scientific institutions) is proposed for complete studies of all medicinal plants.—*John A. Stevenson.*

1910. Houseman, Percy A. **Comparative researches on the methods proposed for the estimation of glycyrrhizin in licorice root and in licorice extract.** Amer. Jour. Pharm. 93: 388–414, 455–481. 1921.—This is a translation, by Houseman, of the prize research paper of the Hagen-*Bucholz Foundation, 1913–1914, by* Armin Linz *(Arch. Pharm.* 254*: 65–134, 204–*224. 1916.—*Anton Hogstad, Jr.*

1911. Houseman, Percy A. **Studies on licorice root and licorice extract.** Amer. Jour. Pharm. 93: 481–495. 1921.—The author discusses the Linz [see preceding entry] method for the determination of the glycyrrhizin content of licorice root, also giving details of his method. The published figures for glycyrrhizin in licorice root are too low. Tbe author has obtained 10 per cent of glycyrrhizin for Spanish and Greek roots and 14 per cent for the Anatolian with Russian and Chinese intermediate.—*Anton Hogstad, Jr.*

1912. Knuth, Richard. **Pelargonium oil.** Amer. Jour. Pharm. 93: 302–315. *Pl. 1, fig. 1–4.* 1921.—The author presents the 1st part of a comprehensive review of the rose-geranium, yielding pelargonium oil, which is used as a substitute for rose-oil. The classification of the plant, with a review of the pertinent literature, is dealt with in detail. The paper also includes a discussion of the morphological constitution of the glands; geographical distribution of tbe rose-geranium; cultivation; quality and cultivation of the soils; propagation; diseases; harvest; distillation; proceeds and exportation statistics. [See also following entry.]—*Anton Hogstad, Jr.*

1913. Knuth, Richard. **Pelargonium oil.** Amer. Jour. Pharm. 93: 376–387. 1921.—In this installment [see also preceding entry] the author discusses the chemical constitution of the oil. Pelargonium oil is now known to contain the alcohols; geraniol, citronellol, linalol, isoamyl-alcohol; a paraffine; the terpenes phellandrene and pinene; a cyclic ketone; a menthone; a terpineol; a blue-colored high-boiling portion, and different paraffinic acids. The author discusses the various constituents in detail. A bibliography is appended.—*Anton Hogstad, Jr.*

1914. Lerena, Carlos A. **Envenenamiento del ganado *con* plantas *toxicas* argentinas. [Stock poisoning by plants of Argentina.]** Surco [Argentina] 1^4: 6–7. 1921.—The poisonous plants of Argentina are listed, together with the symptoms produced, and the remedies recommended.—*John A. Stevenson.*

1915. Newcomb, E. L., C. H. Rogers, and C. W. Folkstad. **Podophyllum ash standards.** Amer. Jour. Pharm. 93: 429–432. 1921.—The results of the authors' studies on the ash content and purity of 18 samples of *Podophyllum* show that there is considerable variation in the proportionate amounts of roots and rhizomes, and that these parts are sometimes plump and sometimes shriveled. Plump, starchy roots and rhizomes contain a proportionately small amount of calcium oxalate and yield a low ash. Shriveled roots and rhizomes contain less starch, proportionately more calcium oxalate, and yield a high normal ash.—*Anton Hogstad, Jr.*

1916. PEACOCK, JOSIAH C., AND BERTHA L. DEG. [PEACOCK]. **Some notes on the astringencies of red rose and pale rose.** Amer. Jour. Pharm. 93: 497–500. 1921.—The authors extracted andpurified the astringent principles of red rose and pale rose. Although the purification was not a complete one, the materials obtained displayed the peculiar properties of the "tannin of red rose" in their behavior toward reagents. The quantity of the astringent substance was far less in the pale Rose, perhaps less than 1 per cent by weight. As astringency is not a characteristic of any one substance, the authors suggest that this group of plant substances may be well placed under the name of "astringents," with a prefix to indicate the source, as,for example, quercastringent, rosastringent, etc. The crystalline substance, which seems to develop under the influence of a mildew on the unstrained infusion of red rose, is regarded as derived from some water-soluble constituent of the rose. On account of its solubility in chloroform, it is clearly distinguished from the astringent principle.—*Anton Hogstad, Jr.*

1917. QUEVEDO, JOSÉ MARÍA. **El mio-mio o romerillo.** Bol. Agric. Provincia Buenos Aires 1[10]: 3–5. *1 fig.* 1920.—*Baccharis cordifolia* is said to cause heavy losses to stock in Argentina, including horses, cattle, and sheep. The symptoms of the poisoning produced are described and methods of treatment are recommended.—*John A. Stevenson.*

1918. YOUNGKEN, HEBER W. **Hybridization in plants.** Amer. Jour. Pharm. 93: 249–254. 1921.—A discussion of the term hybrid is followed by a number of illustrations of hybridization among plants, with comparisons of the structural characteristics of parents and hybrids. Attention is directed to the fact that only a small amount of work has been done on the hybridization of medicinal plants, which is assumed to offer great possibilities in improving quality and therapeutic efficiency.—*Anton Hogstad, Jr.*

PHYSIOLOGY

B. M. DUGGAR, *Editor*

CARROLL W. DODGE, *Assistant Editor*

(See also in this issue Entries 1448, 1459, 1462, 1513, 1819, 1829, 1839, 1869, 1872, 1873, 1916, 1980, 1983, 1984)

GENERAL

1919. ALEXANDER, JEROME. **Colloid chemistry. An introduction with some practical applications.** *v+90 p.* Van Nostrand Co.: New York, 1919.—This is "an attempt to compress within a very limited space, the most important general properties of colloids, and some of the practical applications of colloid chemistry." To the discussion of such matters as the significance, classification, and properties of the colloids 35 pages of this little book are devoted, while 48 pages are concerned with the practical applications. The biological aspect is treated primarily under the headings "Physiology and Pathology" and "Digestion."—*B. M. Duggar.*

1920. EDDY, W. H. **The vitamine manual. A presentation of essential data about the new food factors.** *121 p.* Williams and Wilkins Co.: Baltimore, 1921.—The arrangement of the data in this work "aims to provide the student with working material and suggestions for investigation as well as information." The 1st chapter relates the story of the discovery of vitamins, and the 2nd is a brief account of chemical studies which have thus far failed to reveal the exact nature of these food factors. Chapters 3 and 4 are devoted to the indirect vitamin tests, the methodology with rats, guinea pigs, and pigeons; likewise the yeast test for vitamin B. A chapter on "sources" is essentially a series of extensive tables giving the relative vitamin content of about 90 foods or food products. Of the remaining 3 chapters, the most important physiologically is that devoted to the properties of these food factors, with consideration also of heat resistance. Vitamin in diets and diseases that result from vitamin deficiencies are the remaining topics. A bibliography of 28 pages is included.—*B. M. Duggar.*

DIFFUSION, PERMEABILITY

1921. EATON, S. V. **Osmotic pressure in the potato.** [Rev. of: LUTMAN, B. F. **Osmotic pressures in the potato plant at various stages of growth.** Amer. Jour. Bot. 6: 181–202. *2 fig.* 1919 (see Bot. Absts. 3, Entry 800).] Bot. Gaz. 69: 272. 1920.

1922. EGGERTH, A. H. **The preparation and standardization of collodion membranes.** Jour. Biol. Chem. 48: 203–221. 1921.—A simple method of preparing a graded series of collodion membranes of wide range of permeability is presented.—*G. B. Rigg.*

1923. WALLER, A. D. **On the contractility of amputated parts of plants.** Jour. Physiol. 54: lv–lvii. 1920.—Elongation as a result of growth and as a result of turgor changes differs in that the former is irreversible and the latter reversible. At magnifications of 1000 contractions which are visible are not "necessarily due to vegetable contractility analogous with the contractility of animal muscles," but are due to turgor changes. Tetanisation of plant parts may be similar to a corresponding phenomenon in non-living materials, such as a fiddle string, and is not to be taken as evidence of "physiological contractility nor of a physiological modification of growth."—*Ernest Shaw Reynolds.*

1924. WRIGHT, A. E. **On "intertraction" between albuminous substances and saline solutions.** Proc. Roy. Soc. London **B**, 92: 118–124. 1921.—Layers of egg albumen or serum separating pure water (above) from hypertonic salt solution (below) interfuse with the latter only. Finger-like processes extend from the albumen into the salt solution and vice versa. *Aqueous bacterial suspensions penetrate very short distances into hypertonic salt solution* while serum suspensions migrate rapidly throughout.—*Paul B. Sears.*

MINERAL NUTRIENTS

1925. CANALS, E. **Du rôle physiologique du magnésium chez les végétaux.** [**The physiological role of magnesium in plants.**] Thèses. (Série A. No. 859. No. d'ordre 1659.) *133 p., 4 pl.* Roumégous and Déhan: Montpellier, 1920.—The author examined the methods of quantitative determination of magnesium and calcium in plants and found that for accurate work great care must be exercised not to vary the methods of precipitating the 2 substances. Calcium was obtained in the form of calcium oxalate and magnesium in the form of magnesium pyrophosphate.—With the exception of the grasses, analyses of different types of plants showed a higher percentage of magnesium in the stems than in the roots. Hydrophytes as a group gave higher percentages of magnesium than the xerophytes. Among the ferns the xerophytic types gave a higher percentage than the hydrophytes.—Using Detmer's solution in which the magnesium sulphate content was varied from 0–1000 mgr. per l., the author found that roots of peas and corn reached their maximum growth in a solution containing 500 mgr. per l.; for stems the optimum was 100 mgr. *Aspergillus niger* in Robert's solution gave a maximum growth with 500 mgr. of magnesium sulphate per l. No growth was obtained in magnesium-free solutions.—Magnesium is toxic only in excessive quantities.—*Ferd. S. Wolpert.*

1926. HART, E. B., H. STEENBOCK, AND C. A. HOPPERT. **Dietary factors influencing calcium assimilation. I. The comparative influence of green and dried plant tissue, cabbage, orange juice, and cod-liver oil on calcium assimilation.** Jour. Biol. Chem. 48: 33–50. 1921.—Limited data indicate that the same factor (vitamin) affecting calcium assimilation and resident in green oats and grasses is present in cod-liver oil.—*G. B. Rigg.*

1927. PETERS, R. A. **The effect of substituting uranium for potassium in growth media.** Jour. Physiol. 54: li–lii. 1920.—In quartz tube cultures uranium could not be substituted for potassium and give 3–4 sub-cultures of *Colpidium.* When added to a potassium culture, uranium stimulated growth. Radio activity of potassium is not its sole use in cultures—if it has such a function.—*Ernest Shaw Reynolds.*

1928. Peters, R. A. **The substances needed for the growth of a pure culture of Colpidium colpoda.** Jour. Physiol. 55: 1–32. 1921.—This protozoan was kept in a pure tube-culture for a year in a medium of "glass-distilled water, calcium, potassium and sodium chlorides, magnesium sulphate, and ammonium glycero-phosphate." Ammonium phosphate and chloride could not be omitted without inhibition of growth. When magnesium and potassium were left out of quartz-tube cultures growth stopped. The omission of sodium, calcium, and sulphate separately had no effect. Uranium could not be substituted for potassium. Amino acids may be used in place of ammonium as a nitrogen source.—*Ernest Shaw Reynolds.*

METABOLISM (GENERAL)

1929. Albertoni, I., e G. Bosinelli. **Composizione chimica delle paglie di diverse varietà di frumento coltivate nelle stesse condizioni. Loro valore foraggero. [Chemical composition and nutritive value of the straw of different varieties of wheat grown under the same cultural conditions.]** Staz. Sper. Agrarie Ital. 54: 129–136. 1921.—The investigation was undertaken to determine whether the straws of different varieties of wheat differed chemically, and whether such differences can be correlated with varietal characteristics. [The 3rd part of the study, which discloses the percentage of digestible substances in these straws, need not here be abstracted.] Pure line selections were studied after careful cleaning to eliminate weed parts and subjected to the following determinations: moisture, protein substances, fats, nitrogen-free extractives, crude fiber, ash; also CaO and P_2O_5. The varieties studied were the following: Cimone, Normale, Cologna 12, Rieti-I and Rieti-II, Masoline, Gentile rosso-58, Gentile rosso-48, Bordeaux red, Inallettabile-38, Poulard of Australia, Turgido nero, and Duro Portonuovo. The conclusions drawn are the following: The influence of leaves, the height of the culm, etc., upon the crude fiber content should be kept in mind when the latter is considered in relation to the lodging of the straw. The term crude fiber as it is here used does not indicate all nor always the same chemical substance or substances of the plant skeleton, and this fact should not be overlooked when this determination is taken as an indication of stiffness of mature straws. It is the insoluble residue after treatment with dilute H_2SO_4 and NaOH, and botanically it constitutes the greater portion of the cell walls; nevertheless, it does not include all the cellulose nor all the pentoses nor all those substances grouped under the term lignin, since these are not insoluble in the solvents used. Nevertheless, it appears that the varieties more resistant to lodging have culms and leaves with a greater crude fiber content. According to the authors this fact should not be considered essential.—*A. Bonazzi.*

1930. Anderson, R. J. **Acerin. The globulin of the maple seed (Acer saccharinum).** Jour. Biol. Chem. 48: 23–32. 1921.—The principal protein of the seed of this maple has been isolated and purified and the name acerin proposed. It is a globulin. When purified it is a nearly white heavy powder which on combustion leaves no weighable ash. Much of the basic nitrogen is present as lysine.—*G. B. Rigg.*

1931. Bell, W. H. **A method for the detection of phenols produced by bacteria.** Jour. Infect. Diseases 29: 424–428. 1921.—A method is described for the detection of phenols in bacterial cultures in concentrations of 1:500,000.—*Selman A. Waksman.*

1932. Bridel, M., et R. Arnold. **Sur une méthode permettant l'application, aux végétaux du procédé biochimique de recherche du glucose. [A biochemical test for glucose applicable to plants.]** Compt. Rend. Acad. Sci. Paris 172: 1434–1436. 1921.—A method is given for testing for glucose in plant extracts. It is based on the previous work of Bourquelot and Bridel, who used emulsin to secure the β methylglucoside.—*C. H. Farr.*

1933. Czapek, Friedrich. **Zur Kenntnis der silberreduzierenden Zellsubstanzen in Laubblättern. [Silver-reducing cell substances in foliage leaves.]** Ber. Deutsch. Bot. Ges. 38: 246–252. 1920.—This paper was called forth by Molisch's report (1) of the deep black coloration of chloroplasts of living cells treated with 1/10–1 per cent solutions of silver nitrate, (2) in particular, that the silver-reducing substance undergoes a change by which it loses its

silver-reducing power at the moment of the chloroplast's death, and (3) that the substance in question is identical with the carbon dioxide-reducing substance or has a close relation with carbon dioxide assimilation. The reaction in question suggested to the author the reduction of silver nitrate in the cold by pyrocatechol. This substance is precipitated by neutral lead acetate, and the lead salt thus produced, even when washed until no free pyrocatechol is present, gives a distinct reduction of silver. Sections of various leaves treated with lead acetate solution and then washed free of excess of the lead salt showed ability to reduce silver nitrate as in living cells,—evidence that a "Lebensreaktion" is not involved. Czapek inactivated the ferments present and extracted a substance which gave strong silver reduction in the cold. The chemical investigation has not been completed but the substance has been secured in crystalline form. It seems unlikely that it has any connection with carbon dioxide assimilation. The quantity of the silver-reducing substance in the leaves was quickly reduced by enzyme action, on drying, when no measures were taken to inactivate the enzymes.—*R. M. Holman.*

1934. Dutcher, R. A., H. M. Harshaw, and J. S. Hall. **Vitamine studies. VIII. The effect of heat and oxidation upon the antiscorbutic vitamine.** Jour. Biol. Chem. 47: 483–488. 1921.—The substance or substances (vitamin) responsible for the antiscorbutic properties in orange juice are susceptible of oxidation, but in the absence of oxidizing agents are stable to heat up to the boiling point of orange juice.—*G. B. Rigg.*

1935. Eddy, W. H., Hattie R. Heft, Helen C. Stevenson, and Ruth Johnson. **Studies in the vitamine content. II. The yeast test as a measure of vitamine B.** Jour. Biol. Chem. 47: 249–275. 1921.—Until a basal medium is worked out that provides an optimum of all the factors, except vitamin B, the test must be considered of little value in the estimation of true vitamin content.—*G. B. Rigg.*

1936. Everest, A. E., and A. J. Hall. **Anthocyanins and anthocyanidins. Part IV. Observations on: (a) Anthocyan colors in flowers and (b) the formation of anthocyans in plants.** Proc. Roy. Soc. London **B**, 92: 150–162. 1921.—The author confirms the hypothesis of Willstätter et al. on the constitution of the blue anthocyan pigments. The findings of K. and Y. Shibata and Kasiwagi (Jour. Amer. Chem. Soc. 41: 208–220. 1919) are considered of no value. The blue colors in anthocyan flowers are considered as due to anthocyan phenolates of alkali or alkaline earth metals or complex anthocyan iron salts. In the former case the pigments decolorize on standing, due to a pseudo-base formation. The effects of various salts on anthocyan pigments are recorded and the preparation of the mother substance is noted. Evidence is adduced from a study of developing buds to show that flavonol formation precedes anthocyanin production, probably as an intermediate step. No observational evidence is given for the production of flavonols through anthocyanins.—*Paul B. Sears.*

1937. Howard, Grace E. **Extraction and separation of the pigments of Nereocystis luetkeana.** Publ. Puget Sound Biol. Sta. 3: 79–91. 1921.—It is possible to extract chlorophyll *a* and *b*, carotin, xanthophyll, and fucoxanthin, following the general processes used by Willstätter, but it seems impossible to do this with pure solvents. When put into a colloidal state the chlorophyll carries a negative charge. Magnesium proved to be present in chlorophyll; and there is good evidence of the presence of chlorophyllase in kelp.—*T. C. Frye.*

1938. Kohn-Abrest, Émil. **Detecting poisons in food substances.** Sci. Amer. Monthly 3: 325–328. 1921. [Translated from *La Science et La Vie* Dec., 1920; Jan., 1921.]—There is discussed, among other things, the occurrence of hydrocyanic acid in beans and stone fruits.—*Chas. H. Otis.*

1939. Kraemer, Henry. **Plant colors.** Amer. Jour. Pharm. 93: 414–416. 1921.—In this review of the known facts concerning the nature of plant color, the author discusses the anthocyanins. The name anthocyanin, as 1st given by Marquardt, may be used to designate all plant colors other than green and yellow, which are plastid pigments.—*Anton Hogstad, Jr.*

1940. Kraemer, Henry. **Some experiments on the modification of color in plants.** Amer. Jour. Pharm. 93: 416–418. 1921.—There are reported briefly some experiments conducted nearly 10 years ago dealing with the modification of color in plants.—*Anton Hogstad, Jr.*

1941. Peters, R. A. **Nutrition of the protozoa.** Jour. Physiol. 54: l–li. 1920.—Ammonium glycerophosphate served as a complete source of carbon, nitrogen, and phosphorus for *Colpidium*. Ammonium salts will furnish the nitrogen. As sources of carbon the following gave no growth: carbonate, formate, oxalate, glycollate, and citrate; while glycerate, glycerophosphate, tartrate, glucose plus lactate, and leucine (synthetic) gave growth as measured by capability of carrying through 3–4 subcultures. The organism is not dependent upon complicated bodies for its growth and is widely tolerant of the ratio between potassium and calcium salts.—*Ernest Shaw Reynolds.*

1942. Sando, Charles E., and H. H. Bartlett. **Occurrence of quercetin in Emerson's brown-husked type of maize** [see Bot. Absts. 10, Entry 528]. Jour. Agric. Res. 22: 1–4. 1921.—The brown husks contain quercetin and a quercetin glucoside; both are lemon yellow in color. If they account for the truly brown color of the husks it must be through their tinctorial quality. The quercitin glucoside of the brown type probably is the counterpart of anthocyanin of the purple type. It is predicted that the pigment of the latter type will be allied to cyanin.—*D. Reddick.*

1943. Steenbock, H., Mariana T. Sell, and P. W. Boutwell. **Fat-soluble vitamine. VIII. The fat-soluble vitamine content of peas in relation to their pigmentation.** Jour. Biol. Chem. 47: 303–308. 1921.—In ripe peas, out of 6 samples investigated, those of green color and carrying also considerable yellow pigment, were far richer in fat-soluble vitamin than yellow peas which contained much less yellow pigment.—*G. B. Rigg.*

1944. Steenbock, H., Mariana T. Sell, and Mary Buell. **Fat-soluble vitamine. VII. The fat-soluble vitamine and yellow pigmentation in animal fats with some observations on its stability to saponification.** Jour. Biol. Chem. 47: 89–109. 1921.—In general butters highly pigmented are rich in the vitamin, though the parallel is not close. In beef fats the relations are somewhat similar. In cod-liver oil there is high content of fat-soluble vitamin with low content of yellow pigments. The fat-soluble vitamin withstands severe methods of saponification, hence is not a fat and probably not an ether.—*G. B. Rigg.*

1945. Verkade, P. E., und N. L. Söhngen. **Die Angriefbarkeit von cis-transisomeren ungesättigten Säuren durch Pilze. [The capacity of cis- and transisomers of unsaturated acids to be utilized by fungi.]** Centralbl. Bakt. II Abt. 50: 81–87. 1920.—The organisms used were *Aspergillus niger* and *Penicillium glaucum*. The culture medium was tap water with the addition of the following, expressed in per cent: 0.05 KH_2PO_4, 0.05 $MgSO_4$, 0.01 $FeCl_3$, 0.01 $MnSO_4$, and 0.05 $(NH_4)_2SO_4$ or 0.05 KNO_3. The source of nitrogen made no difference in the results. Experiments were carried out with the calcium salts of 20 acids of the oleic series. The results given show no uniformity of utilization, hence no definite conclusion can be drawn. H-ion determinations were made, also the relative solubilities in water and olive oil were determined. A table showing solubilities and distribution coefficients is given. A brief report of the literature is included.—*Grace E. Howard.*

1946. Woodard, J. **Determination of biological fluids.** [Rev. of: Duggar, B. M., and C. W. Dodge. **The use of the colorimeter in the indicator method of H-ion determination with biological fluids.** Ann. Missouri Bot. Gard. 6: 61–70. *Fig. 1.* 1919 (see Bot. Absts. 4, Entry 1449).] Bot. Gaz. 69: 269–270. 1920.

METABOLISM (NITROGEN RELATIONS)

1947. Boas, S. **Selbstvergiftung bei Aspergillus niger. [Self-poisoning of Aspergillus niger.]** Ber. Deutsch. Bot. Ges. 37: 63–65. 1919.—This paper is an account of another case of self-poisoning as the result of the production of large quantities of ammonia from urea

(and presumably also amine, through proteolysis) in fungus cultures. Reference is made to the author's recent paper on self-poisoning in *Cladosporium* (Annales Mycologici) and Wehmer's publication on *Penicillium* and *Aspergillus fumigatus* (Ber. Deutsch. Bot. Ges. 1913). With *Aspergillus niger* the phenomenon is very pronounced when the fungus is grown in 5 per cent maltose and 2 per cent urea plus the necessary mineral substances. Maltose is used instead of saccharose because less oxalic acid is formed when the former sugar is employed and less ammonia is used up in neutralizing the acid. As a result of enzymatic splitting of urea the culture fluid becomes strongly alkaline. The alkalinity of the medium seems to be contributed to by the mould itself, and the odor suggests amine as a product of this latter process. The author states the conditions and results of 4 experiments which indicate that in this organism there is a lack of self regulation, the urea-splitting enzyme finally causing death. Cultures of *Botrytis cinerea* and *Oidium* under conditions similar to those used with *Aspergillus niger* remained alive for many months.—*R. M. Holman.*

1948. Chibnall, A. C., and S. B. Schryver. **The isolation of proteins from leaves.** (Preliminary note.) Jour. Physiol. 54: xxxii–xxxiii. 1920.—Ground cabbage leaves were treated with water saturated with ether, thus lowering the surface tension and dissolving otherwise insoluble nitrogenous materials. The latter were precipitated by vaporizing the ether and raising the temperature gradually to 40–60°C. The dried powder was freed from lipoids and chlorophyll and was then separable into 2 portions, one soluble in dilute alkalies and the other insoluble in solvents. The latter portion contained 12 per cent nitrogen and an amorphous acid precipitated by mineral acids from the first portion 11 per cent.—*Ernest Shaw Reynolds.*

1949. Kayser, E. **Influence de la matière azotée élaborée par l'Azotobacter sur le ferment alcoolique. [The influence of the nitrogen compounds elaborated by Azotobacter on alcoholic fermentation.]** Compt. Rend. Acad. Sci. Paris 172: 1539–1541. 1921.—The author attempts to test the hypothesis of Lipman that the effect of *Azotobacter* on plants is through its secretions. Experiments were made with yeast. The addition of *Azotobacter* to the solution containing yeast causes an increase in the multiplication of the yeast cells, an increase in the decomposition of sugar, and in the amount of alcohol formed. The variety of yeast used and the age of the *Azotobacter* cultures were important modifying factors.—*C. H. Farr.*

1950. Levene, P. A. **On the structure of thymus nucleic acid and its possible bearing on the structure of plant nucleic acid.** Jour. Biol. Chem. 48: 119–125. 1921.

1951. Sure, Barnett, and J. W. Read. **Biological analysis of the seed of the Georgia velvet bean, Stizolobium deeringianum.** Jour. Agric. Res. 22: 5–15. 1921.—Hulled seed of velvet bean fed raw to rats proved injurious even when constituting only 40 per cent of the total ration. By cooking for 1 hour at 15 pounds pressure the seed may constitute 60 per cent of a ration without injury, but when they constitute 80 per cent some harmful effects are noted.—The seed are rich in fat-soluble vitamin, which is stable for the treatment given above. The proteins and salts of velvet bean are deficient foods for growth.—*D. Reddick.*

METABOLISM (ENZYMES, FERMENTATION)

1952. Grey, E. C., and E. G. Young. **The enzymes of B. coli communis. Part V. (a) Anaerobic growth followed by anaerobic and aerobic fermentation. (b) The effects of aeration during the fermentation.** Proc. Roy. Soc. London B, 92: 135–150. 1921.—The effect of anaerobic and aerobic growth upon subsequent fermentation of glucose under various conditions has been studied. With anaerobic growth subsequent fermentations yield little lactic or succinic acid, acetic acid appearing instead. Lactic acid production is associated with rapid multiplication of cells, while the production of carbon dioxide with acetic acid or alcohol indicates low vitality. The stimulating effect of oxygen outlasts the stimulus and is not chemically proportional to it. The presence of oxygen during fermentation tends to increase lactic, acetic, and succinic acids as against hydrogen, carbon dioxide, and formic

acid, but does not change alcohol production. The ratio of alcohol to acetic acid fluctuates more under anaerobic than under aerobic fermentation, oxygen being believed to inhibit autoreduction. Aerobic fermentation products show less gain in oxygen than anaerobic; water may be the oxygen source.—*Paul B. Sears.*

1953. Hall, I. C. **A constricted tube with mechanical seal for anaerobic fermentation tests.** Jour. Infect. Diseases 29: 317–320. 1921.—The principle of the constricted tube with a mechanical seal devised by the writer in 1915 for aerobic—anaerobic sterility tests is here combined with the fermentation tube. The anaerobic arm is closed with a rubber stopper, thus making it easier to clean and permitting transfers to be made from the closed arm without admixture from the medium above the seal exposed to the air.—*Selman A. Waksman.*

1954. Hall, I. C. **Criteria in anaerobic fermentation tests.** Jour. Infect. Diseases 29: 321–343. 1921.—Gas production and titratable acidity cannot be used as criteria in anaerobic fermentation tests; an increase in the H-ion concentration is regarded as the best evidence of such fermentation.—*Selman A. Waksman.*

1955. Morgulis, S. **A study of the catalase reaction.** Jour. Biol. Chem. 47: 341–375. 1921.—A crude preparation from liver was used. Little credence can be given to quantitative results of catalase experiments unless very large differences are demonstrated.—*G. B. Rigg.*

1956. Randall, S. B., and I. C. Hall. **The use of B. Welchii in the preparation of sugar-free culture medium.** Jour. Infect. Diseases 29: 344–358. 1921.—It is suggested to use *Bacillus Welchii*, in place of *B. coli*, for the preparation of sugar-free broth, the former removing the muscle sugar, by fermentation, more efficiently.—*Selman A. Waksman.*

METABOLISM (RESPIRATION)

1957. Adolph, E. F., and R. M. Ferry. **The oxygen dissociation of hemoglobin and the effect of electrolytes upon it.** Jour. Biol. Chem. 47: 547–555. 1921.—The equilibrium between oxygen and hemoglobin is a function of that between hemoglobin and electrolytes.—*G. B. Rigg.*

1958. Buckmaster, George A. **The absorption curve of haemoglobin and carbon dioxide.** Jour. Physiol. 54: xcii–xciii. 1921.—The author finds for about 25 points between 0 and 98 mm. pressure of CO_2 "that solutions of haemoglobin behave towards this gas according to the Dalton-Henry law."—*Ernest Shaw Reynolds.*

1959. Haggard, H. W., and Y. Henderson. **Hemato-respiratory functions. XII. Respiration and blood alkali during carbon monoxide asphyxia.** Jour. Biol. Chem. 47: 421–432. 1921.—Oxygen deficiency itself does not directly cause in the tissues and blood an increased production of organic acids.—*G. B. Rigg.*

1960. Wolk, P. C. van den. **Excretions in plants.** Sci. Amer. Monthly 3: 417–418. 1921. [Translated from Die Umschau (Frankfurt), Jan. 29, 1921.]—Flowers, leaves, fruit, and bark are regarded as excretory organs.—*Chas. H. Otis.*

ORGANISM AS A WHOLE

1961. Bonazzi, Augusto. **Studies on Azotobacter chroococcum Beij.** Jour. Bact. 6: 331–369. *Fig. 1–6.* 1921.—A series of 18 experiments is reported in which the utilization of glucose and nitrogen is studied. It was found that *Azotobacter* utilizes the glucose in the building up of its cell substance and in the preparation of non-reducing substances; these "stores" of carbonaceous material are slowly digested in the presence of oxygen during the process of later development. The sugar is undoubtedly worked over by the cells during the early stages of growth and is then slowly utilized by the cells. It is believed that the sugar apparently lost from a culture in the early stage of development passes through the cells in

large quantities and is transformed into compounds which do not form an integral part of the cells themselves, but are dissolved in the medium. The work on utilization of nitrogen has led to the conclusion that the primary importance of nitrates is in the process of sugar utilization, possibly performing an intermediary function in sugar fermentation and assimilation in forming a sugar-nitrate complex. It is the belief of the author that *Azotobacter*, rather than serving as an active nitrogen gatherer in the soil, may act to immobilize the nitrate nitrogen and to prevent or retard denitrification.—*Chester A. Darling.*

1962. DERNBY, K. G., AND J. BLANC. **On the growth and the proteolytic enzymes of certain anaerobes.** Jour. Bact. 6: 419–430. *Fig. 1–2.* 1921.—By a series of tests upon 6 species of *Clostridium* the author determined that the optimal H-ion concentration for the growth of these anaerobes was between P_H 6.5 and 7.5, or an average of P_H 7. In the production of proteolytic enzymes, tryptase is probably formed; its activity is optimal at about P_H 6.—*Chester A. Darling.*

1963. DRAGHETTI, ALFONSO. **Studio comparativo della resistenza meccanica all'allettamento di alcune razze pure di frumenti. [A comparative study of the mechanical resistance to lodging of some pure strains of wheat.]** Staz. Sper. Agrarie Ital. 54: 145–180. 1921.—The author starts from the assumption that the immediate condition resulting in lodging is an unbalanced equilibrium between external influences and intrinsic resistance of the plant tissues; thus, lodging is immediately a mechanical phenomenon. The more remote causes are classified in 3 groups; (1) nitrogenous hypernutrition, (2) meteorological causes, (3) mechanical maladjustments of the culm. A fundamental cause of predisposition must be searched for in the intensive selection by man, tending to modify the statics of the culm and render it sensitive to adverse nutritive conditions. The author states that lodging takes place before the complete development of the inflorescence, while the plant is still green, and when the resistance of the culms is due more to the turgidity of the cells than to the differentiation of special tissues. The object of the investigation was to determine (1) the existence or non-existence of positive or negative values to be attributed to various varieties under given cultural and biologic conditions; (2) the evaluation of such characters or values as a guide for selective procedures; and (3) the description from a "statical" standpoint of the "*type plant*" free of racial defects. The studies were made on culms at the critical period of stability; the plants while still green were exposed to stormy weather. Pure strains were studied, comprising dwarf, medium, and giant plants as well as beardless, short-bearded, and long-bearded strains, in order to determine the influence of the cross section on the resistance of the culm. The following determinations were made on the green specimens, immediately as brought from the field and before wilting had set in: Total weight, height of culms, position of center of gravity, length, weight, diameter, and thickness of the wall of every internode, weight necessary to determine the "flexion-breaking-point" of the inferior part of every main stalk the "arrow" of inflection, the angle of flexion in degrees, the elasticity of the culm, moments of inertia and of resistance, unity coefficient of breaking moment, moment of wind pressure, moments due to shift of center of gravity, moments of adhesive water, moment of collision of culms, torsion forces, etc. A special apparatus is described and by an integration of the various factors here mentioned a formula is obtained which, unlike that of Kirsche, of *Schweziki-Holdfeiss, and of Albrecht, takes into consideration all factors contributory to* resistance or weakness, and thus approaches more the dynamic conditions to which the culm is subjected in the field. Naturally all these factors are correlated with thick and thin seeding and related to the photosynthetic activity of the plant. The forces acting on a culm may be permanent and intermittent. The effect of all these forces is a "dynamic moment" and is equal to the product of their absolute entity by their distance of application from the point of the most vulnerable section. The lower internodes and the "linea di terra" are most subject to the effect of external forces. The length and number of successive internodes are also extremely important. The static equilibrium and the balance of the positive and negative moments of the culm gives a value which constitutes the "index of resistance," which may bear a (+), positive, or (—), negative, sign according to whether it defines culms respectively

resistant or non-resistant to lodging. This index, with remarkable accuracy, expresses mathematically the exact conditions found to exist in the field; the varieties with a (+) index always standing erect, those with a (—) index always lodging in the order of the absolute value of the index number.—*A. Bonazzi.*

1964. GAGER, C. STUART. [Rev. of: REINHEIMER, H. **Symbiosis: a socio-physiological study of evolution.** *xii+295 p.* Headley Bros.: London, 1920 (see Bot Absts. 10, Entry 1966).] Torreya 21: 85–86. 1921.—The book is based on the thesis that everything normal in organic evolution is due to essentially cooperative behavior. The reviewer indicates that numerous statements about plants are inaccurate or incorrect, and sure to mislead readers unfamiliar with botany. Maeterlinck's ideas on the intelligence of plants are apparently accepted *literatim.*—*J. C. Nelson.*

1965. HITCHENS, A. P. **Advantages of culture mediums containing small percentages of agar.** Jour. Infect. Diseases 29: 390–407. 1921.—It is suggested to use 0.1 per cent agar in culture media for the primary cultivation of specimens suspected of containing anaerobic bacteria and for the study of the physiological relations of pure cultures. This agar gel, composed of colloidal particles in a state of equilibrium, resists the penetration of oxygen, thus offering excellent conditions for the development of anaerobic bacteria and for bacteria requiring partial oxygen tension.—*Selman A. Waksman.*

1966. REINHEIMER, H. **Symbiosis: A socio-physiological study of evolution.** *xii+295 p.* Headley Bros.: London, 1920.—The present is not a scientific treatment of symbiosis but, as the title indicates, a philosophical or "socio-physiological" discussion based on the phenomena of symbiosis. Chapter V, The "Intelligence" of Plants, is based on Maeterlinck's L'Intelligence des Fleurs. In Chapter IV, Parasitism vs. Symbiosis, the author states that "biologists fail to recognize that the principle of parasitism differs *toto coelo* from that of symbiosis." [See also Bot. Absts. 10, Entry 1964.]—*C. S. Gager.*

MOVEMENTS OF GROWTH AND TURGOR CHANGES

1967. LANGER, HELENE. **Zur Kenntnis der tropistischen Krümmungen bei Lebermoosrhizoiden. [Concerning the tropistic curvatures of liverwort rhizoids.]** Ber. Deutsch. Bot. Ges. 37: 262–272. *Fig. 1–2.* 1919.—The gemmae of *Lunularia vulgaris* furnished the principal material. Gemmae of *Marchantia* and thalli of *Riccia fluitans* were also used and gave results similar to those with *Lunularia.* The rhizoids gave a positive geotropic reaction. Weak unilateral illumination sufficed to suppress the geotropic curvature. The rhizoids proved to be positively aerotropic and, according to the concentrations used, positively or negatively chemotropic to KNO_3 and grape sugar. With asparagin and tyrosin, in the concentrations employed, only positive reactions were secured and with $CaHPO_4$ only negative reactions.—*R. M. Holman.*

1968. LIESE, J. **Über den Heliotropismus der Assimilationszellen einiger Marchantiaceen. [Heliotropism of the assimilating cells of certain of the Marchantiaceae.]** Ber. Deutsh. Bot. Ges. 37: 293–298. *Fig. 1–4.* 1919.—This is a report of experiments with *Marchantia polymorpha, Fegetella conica,* and other Marchantiaceae. The author found that the direction of illumination of the thalli determined the orientation of those filaments of assimilating cells which developed during the exposure.—*R. M. Holman.*

1969. STARK, PETER. **Über traumatotropische und haptotropische Reizleitungsvorgänge bei Gramineenkeimlinge. [On traumatotropic and haptotropic stimulus conduction in seedlings of the Gramineae.]** Ber. Deutsch. Bot. Ges. 37: 358–363. *Fig. 1–13.* 1919.—The author performed with wound- and contact-stimulated coleoptiles experiments similar to those which Paal (Jahrb. Wiss. Bot. 58: 1918) performed with phototropically-stimulated coleoptiles. The principal question which he sought to answer was whether a stimulus can be transferred from one individual to another of the same or different species. The experiments showed that

a wound stimulus, resulting from contact of one side of the coleoptile with silver nitrate or a red hot glass rod, can be transmitted from a coleoptile tip, which has been amputated and subsequently replaced upon the stump of a coleoptile, across the wound surfaces into the basal part of the coleoptile. This was found to be the case even when the stimulated tip and the stump were from different individuals of (1) the same species, (2) different species, or (3) different genera, though in the last case positive results were not so frequently secured. The material experimented with gave similar results when subjected to contact stimulation. It was also possible to secure a tropistic curvature when a little fragment of injured tissue from the same or some other species was placed eccentrically on the wound surface of a coleoptile stump.—*R. M. Holman.*

TEMPERATURE RELATIONS

1970. WEISS, H. **The thermal death point of the spores of Bacillus botulinus in canned foods.** Jour. Infect. Diseases **29**: 363–368. 1921.—The thermal death point of spores of *B. botulinus* varies with the H-ion concentration of the particular food in question. The more acid foods, such as canned fruits, require a maximum of 50 minutes at 100°, 30 minutes at 105°, and 15 minutes at 110°C., but the majority of canned foods in this group require much shorter exposures. The vegetable products, which are less acid and more nearly approach the neutral reaction, require from 90 to 180 minutes exposures at 100°, 30 to 70 minutes at 105°, and 10 to 20 minutes at 110°C.—The thermal death point also depends on the consistency of the particular food, on presence and concentration of syrup, size of can, size and compactness of the cook, and the retort technic.—*Selman A. Waksman.*

1971. WRIGHT, R. C. **Freezing and undercooling of Irish potatoes.** Potato Mag. 4^4: 14, 16–18. 1921.—Late varieties have lower freezing points, averaging 29.15°F. for the varieties tested. Undercooling at 28°F. for 70 hours, or at 25°F. for 19 hours, caused internal discoloration, which was induced sooner by jarring, air currents, wetting, and rolling in bags.—*Donald Folsom.*

RADIANT ENERGY RELATIONS

1972. DACY, GEORGE H. **Influencia de la luz en el desarrollo de las plantas.** [**Influence of light on the growth of plants.**] Rev. Agric. Tropic. [Salvador] 1:209–216. 1921.—This is a review of the work of Garner and Allard (see Bot. Absts. 5, Entry 22) reprinted from La Hacienda.—*J. A. Stevenson.*

1973. WALKER, W. F., AND R. W. PRYER. **Bactericidal action of water treated by ultra violet rays.** Amer. Jour. Public Health **11**: 703–706. *Fig. 1.* 1921.—Results are given which show "that the exposure of water to ultra violet light emitted from a quartz mercury vapor lamp, imparts to water a definite residual bactericidal property."—*C. A. Ludwig.*

TOXIC AGENTS

1974. PETERS, R. A. **Variations in the resistance of protozoon organisms to toxic agents.** Jour. Physiol. **54**: 260–266. 1920.—The results of experiments testing the toxicity of mercuric chloride upon *Colpidium* plotted as the logarithm of the percentage of survivors gave a straight line curve except a slight "kink" at the beginning. It is reasoned that this type of curve is indicative of variations, of the organisms, in resistance to toxic agents. The study of frequency curves and the logarithmic curve of the S-curve gives the chief data for the argument.—*Ernest Shaw Reynolds.*

1975. ROSE, D. H., HENRY R. KRAYBILL, AND R. C. ROSE. **Effect of salts upon oxidase activity of apple bark.** Bot. Gaz. **69**: 218–236. *5 fig.* 1920.—One-tenth normal solutions of all the chlorides tested (potassium, sodium, lithium, caesium, ammonium, calcium, manganese, ferric) decreased oxidation of pyrogallol by apple bark powder. Oxidation was increased very slightly by 0.1 N solutions of all the sulphates tested. Potassium, sodium, and mag-

nesium nitrates (0.1 N) had practically no effect on oxidation, while nitrates of calcium, barium, manganese, and iron (ferric) decreased it. Potassium chloride (0.02 N and 0.002 N) had no effect on oxidation, while manganese chloride in these concentrations increased it. Tartrates, oxalates, citrates, acetates, and carbonates increased oxidation, this being due in part at least to the low acidity of the mixtures of bark, pyrogallol, and salt. Marked decrease in oxidation is not necessarily accompanied by high acidity of the mixtures. Ions other than the hydrogen and hydroxyl may be important in regulating oxidase activity. In neutralizing hydrogen or hydroxyl ions, it is important to take into consideration, in the study of oxidase activity, the possible effect of the salts formed thereby. The chlorides which retard the combustion of tobacco at high temperatures also retard the oxidase action at low temperatures. The effect of the alkali chlorides upon oxidase activity suggests a practical application in preventing the browning of fruits and vegetables during their preparation for canning, preserving, or drying.—*Authors' Abstract.*

ELECTRICITY AND MECHANICAL AGENTS

1976. S., J. [Rev. of: Baines, E. A. **Germination in its electrical aspect.** *xx+185 p., 130 fig.* Routledge: London, 1921.] Jour. Bot. 59: 237–238. 1921.

MISCELLANEOUS

1977. Pringsheim, Ernst G. **Über die Herstellung von Gelatinefarbfiltern für physiologische Versuche.** [*On the preparation of gelatine color filters for physiological experiments.*] Ber. Deutsch. Bot. Ges. 37: 184–186. 1919.—Attention is called to the method, described in an earlier paper by the author, of securing monochromatic color filters by staining fixed, unexposed photographic plates in solutions of various dyes. The difficulty encountered in eliminating the extreme red end of the visible spectrum was overcome by screens prepared by pouring gelatin dissolved in a solution of Grübler's soluble Berlin blue upon clean glass plates. A list is given of the stains used and indications are furnished concerning the light absorbed and that allowed to pass by each of the stains.—*R. M. Holman.*

SOIL SCIENCE

J. J. Skinner, *Editor*

F. M. Schertz, *Assistant Editor*

(See also in this issue Entries 1448, 1459, 1462, 1488, 1651, 1660, 1949)

GENERAL

1978. Alway, F. J., P. R. McMillen, and C. O. Rost. **A successful cooperative experiment on a potash-hungry peat of doubtful lime requirement.** Jour. Amer. Peat Soc. 14[3]: 5–18. 1921.—A typical Minnesota peat soil, having an acid reaction and approximately 1 per cent of lime, contained sufficient nitrogen and lime for clover, barley, flax, corn, sunflowers, potatoes, beets, and cabbage.—*G. B. Rigg.*

1979. Angelis d'Ossat, G. de. **L'argilla colloidale del terreno agrario.** [**The colloidal clay of agricultural soils.**] Staz. Sper. Agrarie Ital. 54: 214–224. 1921.—The question is studied in general, the aim being to show that many of the properties of soil are due not only to the quantity of colloidal clay contained therein, but to the response of the relatively small percentage of this substance to the influence of the various environmental factors. Heat and pressure are regarded tbe most important and are to be considered witb respect to the following manifestations: heat manifested as temperature, sunlight (thermic, actinic, and luminous rays each playing a specific role), evaporation, and freezing. Pressure, considered apart from its heat effects, is also of great importance as is demonstrated by the stability which some metamorphic rocks and shales assume when submitted to it. Reversible and irreversible changes which take place in ordinary soils in the deep layers should bere be ascribed to this action.—*A. Bonazzi.*

1980. Blanck, E., und F. Preiss. **Über die Stickstoffwirkung der sich bei der Konservierung der Jauche mit Formalin bildenden Stoffe auf die Pflanzenproduction. [Influence of the nitrogen, in liquid manure conserved by means of formalin, upon plant production.]** Jour. Landw. **69**: 33–48. 1921.—The hexamethylenetetramine present in liquid manure conserved with formalin acts favorably upon plant production. Aldehyde-urea, a condensation product, did not give favorable results. For best results it is concluded that formalin should not be added to liquid manure until all of the urea has been converted into ammonia.—*F. M. Schertz.*

1981. Christian, H. Basil. **Experiments in soil treatment in the Enterprise District, southern Rhodesia.** Rhodesia Agric. Jour. **18**: 405–410. *2 fig.* 1921.

1982. Coppa, Amalia. **Ricerche sui protozoi dei terreni e delle acque ticinesi. [Researches upon the protozoa of the soils and waters of the Ticino.]** Staz. Sper. Agrarie Ital. **54**: 181–213. *Fig. 1–5.* 1921.—A qualitative-quantitative count of the protozoa found in cultivated soils, irrigated rice fields, irrigated pasture lands, and irrigation waters is presented. The influence of various fertilizers upon these counts was studied and found to be negligible. The geological origin of the soils appears to have a decided influence upon the count. Siliceous soils have a greater protozoan content than calcareous soils. A characteristic facies was found only in rice fields, since water was found to be the factor which influenced to the greatest degree the unicellular life in a soil.—*A. Bonazzi.*

1983. F[yson], P. F. [Rev. of: Beckley, V. A. **The preparation and fractionation of humic acid; and the formation of humus.** Jour. Agric. Sci. **11**: 66, 69. 1921.] Jour. Indian Bot. **2**: 212. 1921.

1984. F[yson], P. F. [Rev. of: Harrison, W. H. **Carbon dioxide in relation to rice soils.** Mem. Depart. Agric. India Chem. Ser. *5: 181-194 1920.]* Jour. Indian Bot. *2: 212. 1921.*

1985. Geilmann, W., und A. van Hauten. **Die Änderung der löslichen Bodensalze und der Schlämmkurve gedüngter Parzellen im Laufe der Entwicklung von Rüben. [Variation of the soluble salts and the elutriation curve of fertilized plots during the course of the development of beets.]** Jour. Landw. **69**: 105–130. 1921.—Plot experiments in 1919 and 1920 showed that the amount of water-soluble salts in the soil was greatly infuenced by fertilizers. Soluble salts varied during the course of the growing season and were found to be somewhat correlated with the moisture content of the soil. Elutriation curves were found to be greatly influenced by fertilizers.—*F. M. Schertz.*

1986. Mezger, C. **Über unterirdische Dampfströmungen und ihre Bedeutung für den Wasserhaushalt des Bodens. [Subterranean water-vapor currents and their significance in the water economy of soils.]** Jour. Landw. **69**: 49–64. 1921.—This study, which is largely a review of the literature, includes a review of conditions which make for an increase and a decrease in the ground water.—*F. M. Schertz.*

1987. Seelhorst, C. von., W. Geilmann, und H. Hubenthal. **Über den Einfluss von Düngung und Pflanzenwuchs auf die Fallkurve von Wasser-Bodengemischen. [Influence of fertilizing and plant growth on the precipitation curve of water-soil mixtures.]** Jour. Landw. **69**: 5–32. 1921.—Wiegner's method was used in the analysis by elutriation and the Kohlrausch-Holburn method for estimating conductivity. From various experimental plots the authors collected data on the solubility of the salts in the soil as affected by fertilizing and by the plants grown.—*F. M. Schertz.*

1988. White, J. W., and F. J. Holben. **Soil fertility experiments on De Kalb, Volusia and Westmoreland soils.** Pennsylvania Agric. Exp. Sta. Bull. 166. *23 p., 1 fig.* 1921.—The experiments here reported are located in Center County on De Kalb soil; in Bradford County on Volusia soil; and in Washington County on Westmoreland soil, and comprise 152 plots on 18.4 acres.—On De Kalb soil the average yields for 5 years upon 5 unfertilized plots was for clover hay practically 0; corn, 2.8 bushels; oats, 7.8 bushels; wheat, 0.12 bushels. The maximum application of commercial fertilizers gave an average yield of 1800 pounds clover hay, 39.3

bushels corn, 39.3 bushels oats, and 20.8 bushels wheat. The total yield of all products for this plot was 15,011 pounds as against 2,196 pounds for the rotations average yield on the 5 unfertilized plots. Phosphoric acid has given the greatest yield of grain, clover hay, and Kentucky blue grass. Potash has given the next greatest yield of grain and clover hay while nitrogen has given a greater yield of blue grass than potash. Acid phosphate has been 5 times as effective as rock phosphate, on the basis of equal amounts of phosphoric acid, in bringing about increased yields.—On Volusia soil the results of 2 years' experiments show that lime is indispensible in crop improvement. Six tons of manure with lime gave an increase over manure alone of 1250 pounds hay, 10.8 bushels corn, and 4,378 pounds pasture grasses. Manure reinforced with acid phosphate on limed soil gave an increase over manure used alone of 1350 pounds hay, 20.3 bushels corn and 6,438 pounds pasture grasses.—On the Westmoreland soil the most striking result for the 2 years is to be seen in the comparisons between acid phosphate and rock phosphate. On 4 plots on which the 2 sources of phosphoric acid were compared, acid phosphate was 183 per cent more effective than the rock phosphate for the proportions used in the experiment. Fertilizers carrying nitrogen and phosphorus have been very effective in the production of blue grass as well as native pasture grasses. Manure treatments have shown the greatest development of total pasture grasses, while complete fertilizer has been most effective in developing blue grass.—*C. R. Orton.*

1989. Whitney, Milton. **Fundamental principles established by recent soil investigations.** Science 54: 348–351. 1921.—This review covers the work of the U. S. Bureau of Soils for the last 20 or 30 years. The writer points out the results of study of the texture and organic chemistry of the soil, the mineral chemistry of the soil solution, and the colloidal chemistry of the soil. Lists are given of the organic compounds and of the mineral salts that have been identified from the soil.—*C. J. Lyon.*

1990. Wiegner, G. **Boden und Bodenbildung in kolloidchemischer Betrachtung. [Soil and soil formation considered from a colloid-chemical standpoint.]** *98 p.* Th. Steinkopff: Dresden & Leipsic, 1918.—The relation of colloid chemistry to soil formation is treated by chapters as follows: (1) Later developments in the study of colloid-chemistry; (2) application of the results to soil science; (3) properties of colloidal solutions and precipitates (solid dispersions and dispersoids); (4) the protective influence of humus upon soil dispersions, humus acting like certain albumens in retarding and preventing the precipitation of colloid particles by electrolytes; (5) the reciprocal precipitation of oppositely charged colloids ("dispersoids") and the formation of interchangeable zeolites; and (6) the formation of soils. In the last, soils are classified and described under 7 types ranging from extremely arid to extremely humid. [Through review by Niblas in Naturw. Zeitschr. Forst- u. Landw. 18: 191–195. 1920.]—*J. Roeser.*

1991. Wilson, B. D. **Sulfur supplied to the soil in rainwater.** Jour. Amer. Soc. Agron. 13: 226–229. 1921.—A brief summary is given of the amount of sulphur in rain. If sulphur is applied to soils for the express purpose of supplying the needs of plants with an essential element, its application is unnecessary in many localities and is not desirable in the vicinity of large industrial cities.—*F. M. Schertz.*

ACIDITY AND LIMING

1992. Blair, A. W. **A comparison of magnesian and non-magnesian limestones.** Jour. Amer. Soc. Agron. 13: 220–225. 1921.—Eleven years of work with the 2 forms of limestone are reported on 4 different crop rotations. When measured in terms of total nitrogen returned in crops, the magnesian limestone appears to be slightly superior. The 2 limestones have about the same corrective power when measured by the H-ion concentration and by determinations of lime requirements of samples of the treated soils. The use of magnesian limestone does not indicate any toxic effect.—*F. M. Schertz.*

1993. Frear, William. **The fineness of lime and limestone application as related to crop production.** Jour. Amer. Soc. Agron. 13: 171–184. 1921.—The best limestone for agricultural purposes is said to be that which will pass a 20 or 40 mesh sieve.—*F. M. Schertz.*

1994. GARDNER, FRANK D. **Liming as related to farm practice.** Jour. Amer. Soc. Agron. 13: 210–220. 1921.—A practical discussion of liming is presented.—*F. M. Schertz.*

1995. LIPMAN, JACOB G. **The value of liming in crop rotation with and without legumes.** Jour. Amer. Soc. Agron. 13: 206–210. 1921.—In rotation of non-legumes, lime is not a vital factor in increasing nitrogen yields except in the case of soils well supplied with organic matter or so deficient in lime and other basic materials as to lead to textural deterioration or to the formation of toxic compounds of aluminum or iron. It is difficult and uneconomical to maintain an adequate supply of nitrogen in the soil with rotations of non-legumes. The importance of lime is shown, for the proper accumulation of nitrogen from the atmosphere, in the case of crop rotation with legumes.—*F. M. Schertz.*

1996. MACINTIRE, W. H. **The nature of soil acidity with regard to its quantitative deternination.** Jour. Amer. Soc. Agron. 13: 137–162. 1921.—A review is presented of the present lay literature and a summary of the ideas regarding the acidity of rock-derived soil.—*F. M. Schertz.*

1997. MOOERS, C. A., AND W. H. MACINTIRE. **The comparative effect of various forms of ime on the nitrogen content of the soil.** Jour. Amer. Soc. Agron. 13: 186–205. 1921.—In series of experiments lime in the form of oxide, hydrate, precipitated carbonate, ground imestone, ground dolomite, and precipitated magnesium carbonate were used. Plots of $\frac{1}{0,000}$ acre were treated at the rate of 2 and 8 tons per acre. Liming at the 2-ton rate resulted vith the same loss of soil nitrogen in all the series. Both the oxide and the hydrate when pplied at the rate of 8 tons per acre resulted in a waste of nitrogen. Precipitated $MgCO_3$ nduced losses comparable with those of precipitated $CaCO_3$. The oxide and hydrate induced he greater losses, while ground limestone and dolomite induced the least losses of soil nitro-en. Fine precipitated carbonate when applied at the rate of 2 tons induced nitrogen losses lmost indentical with those of the oxide and hydrate, but when applied with dolomite at the -ton rate ranked with dolomite and ground limestone.—*F. M. Schertz.*

1998. PLUMMER, J. K. **The effect of liming on the availability of soil potassium, phoshorus and sulfur.** Jour. Amer. Soc. Agron. 13: 162–171. 1921.—The addition of calcium nd magnesium compounds does not increase to any practical extent the availability of the oil's store of native potash. Additions of calcium or magnesium does not reduce the necesity of applying phosphates to the soil. The solubility of native soil sulphates apparently is icreased by lime addition.—*F. M. Schertz.*

TAXONOMY OF VASCULAR PLANTS

J. M. GREENMAN, *Editor*
E. B. PAYSON, *Assistant Editor*

(See also in this issue Entries 1477, 1511, 1559, 1650, 1720)

GENERAL

1999. ANONYMOUS. [Rev. of: BRITTON, N. L., AND C. F. MILLSPAUGH. **The Bahama ora.** *viii+695 p.* Ackerman: Bronx Park, New York City (see Bot. Absts. 7, Entry 1429).] our. Botany 59: 112–114. 1921. [See also Bot. Absts. 8, Entry 2235; 10, Entry 322.]

2000. CHEESEMAN, T. F. **Contributions to a fuller knowledge of the flora of New Zealand: o. 7.** Trans. and Proc. New Zealand Inst. 52: 9–16. 1920.—There are listed 33 plants, 7 of hich are introductions, showing extensions of range or peculiarities of habitat. Pneumatohores are described on *Eugenia maire* A. Cunn. *Solanum aviculare* Forst. var. *albiflora* is a ew variety described here.—*Wm. Randolph Taylor.*

2001. [DRUCE, G. CLARIDGE.] **New county and other records.** Bot. Soc. and Exchange lub British Isles Rept. 5: 93–137. 1917 [1918]; 365–412. 1918 [1919]; 635–694. 1919 [1920].

2002. FONTANEL, P. **La taxonomie et la multiplication des espèces en botanique. [Taxonomy and the multiplication of botanical species.]** Nat. Canadien **47**: 174–182, 195–204, 224–234, 244–254. 1921.—Canadian and U. S. A. botanists are charged with multiplying and confusing plant nomenclature, partly through ignorance of French and Latin and especially under the influence of the Darwinian hypothesis of evolution which, ignoring the fixity of species, tends to multiply described varieties. (A) Cuvier's definition: "A species is the collection of all individuals descended one from the other or from common parents, all of whom resemble them as they resemble each other," he would express as: "The assemblage of individuals which can reproduce from among themselves fertile descendants;" or "the assemblage of individuals which are not so far differentiated as to cease to produce together similarly reproductive individuals." (B) He next proceeds to show the great variation produced by soils, physical and chemical influences; temperature, general and at special stages of development; and even organic infections. "It is therefore both proper and prudent to distrust every new species or variety described by a taxonomist who runs rapidly through a region new to him . . . . lists published at the end of vacation excursions, where the new species are figured by half dozens, if not by thousands like the hawthorns of 'Mont-Royal.'"—*A. H. MacKay.*

2003. GLEASON, H. A. [Rev. of: DEAM, CHAS. C. **The trees of Indiana.** Dept. Conservation Indiana Publ. 13. *317 p., 137 pl.* 1921.] Torreya **21**: 66–68. 1921.—This 2nd edition, completely rewritten, recognizes 132 species and 20 varieties. Each species is illustrated by a half-tone plate. The nomenclature is that of the International Code. Descriptions are based on Indiana material. Ranges within the State are discussed in detail, and general notes of a popular nature are added. The attitude toward new varieties and forms is conservative, and the treatment has been carried out with extreme care.—*J. C. Nelson.*

2004. HAYWARD, IDA M., AND G. CLARIDGE DRUCE. **The adventitious flora of Tweedside.** *Large 8 vo., xxxii+296 p., 791 pl.* Buncle & Co.. Arbroath, 1919.—The introduction states that the species enumerated were found by Miss I. M. Hayward, who also supplied the local notes respecting the time and place of occurrence, and the flowering period of the various species. Druce prepared the introduction, classified the plants, and wrote the botanical text and descriptions. The introduction gives the history of Galashiels, which is the chief seat of the tweed industry, an account of sheep and wool, of the methods of ridding wool from various fruits and seeds, and of the manner in which seeds get into streams and germinate on their banks. Three hundred and forty-eight species introduced in wool have been found. These, together with the families and genera to which they belong, are described; also their geographical origin is suggested. One hundred and thirteen species are presumably of Mediterranean origin, 48 eastern European and western Asiatic, 14 central Asiatic, 43 South African, 51 Australasian, 23 North American, 8 Tropical American, 43 South American, and 5 unknown. Of these the genus *Lepidium* afforded a new species each for South America, and Africa, and 2 for Australasia, the island continent also affording a new species of *Millotia* not yet found in its native home. A new hybrid, *Chenopodium Haywardiae* Murr (*C. striatum* × *C. album*), was another interesting discovery. A list of the other introduced species of Tweedside is also given as well as a comparison with the adventive plants enumerated in Thellung's Flore Adventice de Montpellier, 1912.—*G. C. Druce.*

2005. HOLMBERG, OTTO R. **Anteckningar till Nya Skandinaviska Floran. I. [Notes to the New Scandinavian Flora. I.]** Bot. Notiser 1920: 161–166. 1920.—As 40 years have elapsed since the last complete edition of Hartman's Handbook, and 30 years since the first part of the 12th edition (all that was ever published), and many changes in nomenclature have been made and new knowledge added, the author thought it advisable to publish notes while the New Flora was going to the press. In this first paper he discusses the genus *Equisetum*, beginning with the names *E. limosum* L. and *E. fluviatile* L. He regards the latter as a variety of the former, and not, as many botanists have held, the same as *E. maximum* Lam. (= *E. Telmateia* Ehrh.). He criticizes Hartman for regarding *E. fluviatile* the species and *E. limosum* the variety. The author further describes and discusses the following hybrids:

E. arvense × *Thelmateja*, *E. arvense* × *pratense*, *E. hiemale* × *variegatum*, and *E. scirpoides* × *variegatum* (?).—*P. A. Rydberg.*

2006. Pau, C. **El herbario de Planellas. [Planellas' herbarium.]** Brotéria Sér. Bot. **19:** 49–65. 1921.—Señor Pau has studied the herbarium of D. José Planellas y Girald preserved at the University of Barcelona. Ninety per cent of the specimens come from botanic gardens. Planellas's careful labelling rendering confusion impossible, but there is also material from Madrid, Saragossa, and Catalonia, as well as a small amount from botanists. The present article is concerned only with plants from the province of Galicia, Spain, following the *Ensayo de la flora fanerogámica gallega* of Planellas. There are critical notes in most cases, references to the Ensayo, indication of those species of which Galician specimens are wanting in the herbarium, and codification of the names with present day nomenclature, The present installment covers the families Ranunculaceae to Rutaceae [pars?] in the DeCandollean sequence, and is to be continued.—*E. B. Chamberlain.*

2007. White, Jas. W. **Report of the Distributor for 1919.** Bot. Soc. and Exchange Club British Isles Rept. **5:** 801–849. 1919 [1920]. Plants distributed number 7447.—*G. C. Druce.*

2008. Williams, F. N. **Genders of generic names.** Jour. Botany **59:** 205. 1921.—Refers to Jour. Botany **59:** 157, T. A. Sprague's article on "Plant Nomenclature: some Suggestions."—*S. H. Burnham.*

PTERIDOPHYTES

2009. Martin, W. **Pteridophytes of the Banks Peninsula (eastern portion).** Trans. and Proc. New Zealand Inst. **52:** 315–322. 1920.—This paper presents a list of 60 pteridophytes at present known to be growing on the Peninsula, with their localities and habitats. This adds to the known flora 8 species previously reported but which a recent writer (Laing) had considered lost to the region, namely: *Alsophila Colensoi* Hook. f., *Hypolepis distans* Hook, *Pteris tremula* R. Br., *Blechnum vulcanicum* Kuhn, *Polystichum adiantiforme* (Forst.) J. Sm., *Dryopteris velutina* O. Ktz., *Lycopodium scariosum* Forst., and *L. Billardieri* Spring (?). One new record for the area is presented, *Azolla rubra* R. Br. The disappearance of a considerable number of species is attributed to the removal of the forests and the feeding of cattle on the undergrowth in some of the areas that remain.—*Wm. Randolph Taylor.*

2010. Waterlot, et Decary. **Ptéridophytes de l'herbier du Muséum recoltées à Madagascar.** *[Pteridophytes of the herbarium of the Museum collected in Madagascar.]* Bull. Mus. Hist. Nat. [Paris] **26:** 540–546. 1920.—A list is given of the pteriodphytes from Madagascar in the herbarium of the Museum. The specimens are cited with complete data. The determinations were made by Prince Bonapart.—*E. B. Payson.*

SPERMATOPHYTES

2011. Ashe, W. W. **Notes on Rhododendron.** Rhodora **23:** 177–179. 1921.—A description is given of *R. carolinianum margarettae* n. var., a white-flowered variety which resembles the type in habit and is found in the same general region in North Carolina, only farther south and at lower altitudes. The author also reports new stations in North Carolina for *R. atlanticum* Rehd. (*Azalea atlantica* Ashe) and *R. neglectum* n. comb. (*Azalea neglecta* Ashe).—*James P. Poole.*

2012. Bennett, A. **Sparganium angustifolium Michx.** Jour. Botany **59:** 235–236. 1921. —A full synonymy is given.—*Adele Lewis Grant.*

2013. Blake, S. F. **The American species of *Maximilianea* (Cochlospermum).** Jour. Washington [D. C.] Acad. Sci. **11:** 125–132. *Fig. 1–2.* 1921.—The following species and varieties are described: *Maximilianea codinae* (Eichl.) Kuntze, *M. regia* Mart. & Schrank, *M. regia glaberrima* Chod. & Hassl., *M. regia mattogrossensis* (Pilger) Blake, *M. vitifolia*

(Willd.) Krug & Urb., *M. triphylla* sp. nov., *M. tetrapora* (H. Hallier) Blake, *M. orinocensis* (HBK) Kuntze, *M. Parkeri* (Planch.) Kuntze, *M. paviaefolia* (Planch.) Kuntze. A key to the species is given.—*Helen M. Gilkey.*

2014. BRITTEN, JAMES. **James Yates's drawings of cycads.** Jour. Botany 59: 221-224. 1921.—These drawings, given by Mrs. Yates to the Linnaean Society, are enumerated and described.—*Adele Lewis Grant.*

2015. CEDERGREN, GÖSTA R. **Anteckningar till Sverges adventivflora. I. Melilotus Hill.** [Notes on the adventive flora of Sweden.] Bot. Notiser 1920: 135-143. 1920.—The author admits 8 species of *Melilotus* as having been found in Sweden: *M. dentatus* Pers., *M. altissimus* Thuill., *M. albus* Desr., *M. wolgicus* Poir., *M. officinalis* (L.) Desr., *M. neapolitanus* Ten., *M. indicus* (L.) All., and *M. sulcatus* Desf. He also gives 2 keys, one, the more important one, for specimens in fruit, the other for specimens not in fruit. Notes on important characters and distribution are given under each species, and a special diagnosis is given of *M. neapolitanus* and *M. sulcatus*, the 2 rarest species.—*P. A. Rydberg.*

2016. CUTTING, E. M. **A new variety of Stachys sylvatica L.** Jour. Botany 59: 110-111. 1921.—*Stachys sylvatica* var. *immaculata*, native in England, is described as new to science.—*Adele Lewis Grant.*

2017. DRUCE, G. CLARIDGE. **Notes on the British orchids—chiefly the palmate section.** Bot. Soc. and Exchange Club British Isles Rept. 5: 149-180. *Pl. 10-18.* 1917 [1918].

2018. EAMES, EDWARD A. **An unusual form of Habenaria clavellata.** Rhodora 23: 126-127. *Pl. 131.* 1921.—A description is given of an abnormal form of this species in which the ends of the spurs are divided into 2 distinct lobes. This form of corolla was typical of a considerable portion of the plants throughout a large area. Whether this represents a true variety or merely a transitory variation remains to be determined by future observation of this colony.—*James P. Poole.*

2019. FARWELL, OLIVER A. **Corrections in nomenclature.** Rhodora 23: 86-87. 1921.—*Carex gigantea* Rudge has been adopted by certain authors for the plant named by L. H. Bailey *C. grandis*, the *C. gigantea* of Dewey. The author shows by a comparison of the achenes that the 2 are distinct species and proposes that these, together with *C. lupulina*, are best considered as varying forms of 1 widely distributed polymorphous species, which, according to the International Rules, should be known as *C. gigantea* Rudge, with the following variations: forma *minor* n. f.; var. *lupulina* (Muhl.) Farwell, forma *pedunculata* (Dew.) n. f.; forma *Bella-villa* (Dew.) n. f.; var. *grandis* (Bailey) n. var. The synonymy is given for the forms listed.—*James P. Poole.*

2020. FAWCETT, WILLIAM, AND A. B. RENDLE. **Notes on Jamaica plants.** Jour. Botany 59: 224-226. 1921.—The synonymy is given and the reasons for retaining the name *Triumfetta Bartramia* L. for the plant first described by Linnaeus as *Bartramia indica*. *Triumfetta Sloanei* is described as new to science, and *Corchorus acutangulus* is reduced to synonymy under *C. aestuans L.* [See also Bot. Absts. 6, Entry 395; 10, Entry 346.]—*Adele Lewis Grant.*

2021. GIUNG, NGUYEN THANH. **La détermination botanique des haricots exotiques.** [**The botanical determination of exotic beans.**] Compt. Rend. Acad. Sci. Paris 172: 1436-1438. 1921.—The seed characters by which *Phaseolus Mungo* and *P. aureus* may be distinguished are given.—*C. H. Farr.*

2022. GODFERY, M. J. **A new European Epipactis.** Jour. Botany 59: 101-106. 1921.—*Epipactis Muelleri*, hitherto confused with *E. viridiflora* Rchb., is described as a new species. —*Adele Lewis Grant.*

2023. GODFERY, M. J. **Epipactis leptochila Godf.** Jour. Botany 59: 146–147. 1921.—The author raises *Epipactis viridiflora* var. *leptochila* Godf. to the rank of a species, *E. leptochila*.—*Adele Lewis Grant.*

2024. GOOSSENS, M. **Contributions à l'étude du palmier à huile au Congo Belge: 7. Notes sur l'Elaeis guineensis L. var. idolatrica Chev. [Contributions to the study of the oil palm in Belgian Congo: 7. Notes on Elaeis guineensis var. idolatrica.]** Bull. Agric. Congo Belge 11: 54–58. *Fig. 13–15.* 1920.—The variety known as *idolatrica* has been described by various writers, but the specimens figured and photographed were always of young or male plants. The writer describes the fruit of a single tree with the leaf characters of var. *idolatrica*. These leaf characters always occur on isolated trees and he considers that this is a form rather than a true variety.—*E. M. Doidge.*

2025. GUSTAFSON, C. E. **Rubus Wahlenbergii Arrh. var. vestervicensis.** [Diagnosis in Latin; notes in German.] Bot. Notiser 1920: 211–212. 1920.—The variety is described as new to science.—*P. A. Rydberg.*

2026. HIERN, W. P. **New Ebenaceae from Portuguese Congo.** Jour. Botany 59: 128–129. 1921.—Three species are described as new to science: *Maba nutans*, *Diospyros diopa*, and *D. viridicans*.—*Adele Lewis Grant.*

2027. KNUCHEL, H. **Ein stolzer Mehlbeerbaum. [A remarkable mountain ash.]** Schweiz. Zeitschr. Forstw. 72: 20. *1 pl.* 1921.—An unusual specimen of *Sorbus* was found in the district of Altbolz, Griesbach, at an elevation of 635 m. It resembles *Sorbus intermedia* and may be a cross between *S. aria* and *S. torminalis*. It has a diameter at breast height of 48–54 cm., clear length of 9 m., and a total height of 22 m.—*J. V. Hofmann.*

2028. MAIDEN, J. H. **The forest flora of New South Wales.** Vol. VII. Part 6. *P. 239–293, pl. 248–251, 9 photo. illus.* William Applegate Gullick: Sydney, April, 1921.—Eight species are treated in the present part, namely, *Eremocitrus glauca* Swingle, *Eucalyptus tessellaris* F. v. M., *Acacia cana* Maiden, *A. Loderi* Maiden, *Canthium oleifolium* Hook., *C. coprosmoides* F. v. M., *Eremophila maculata* F. v. M., and *E. longifolia* F. v. M. Each species is accompanied by a detailed description, one or more illustrations, and pertinent notes. A 2nd part to the chapter on Insects and Timber Trees appears in this number.—*Ibid.* Part 7. *P. 295–351, pl. 252–255, 6 photo. illus.* August, 1921.—In this part the following species are elaborated: *Duboisia myoporoides* R. Br., *D. Hopwoodii* F. v. M., *Eucalyptus globulus* Labill., *Acacia sentis* F. v. M., *A. Burrowi* Maiden, and *Tarrietia Argyrodendron* Benth. An appendix contains a chapter entitled A Tentative Bibliography of Eucalyptus Oil.—*Ibid.* Part 8. *P. 353–395, pl. 256–259, 8 photo. illus.* 1921.—This part treats the following species: *Livistona australis* Mart., *Eucalyptus robusta* Sm., *Nothofagus Moorei* (F. v. M.) Maiden, and *Daphnandra micrantha* Benth. A chapter is added in the appendix on The Cultivation of *Eucalyptus* in Countries Outside Australia.—*J. M. Greenman.*

2029. MOORE, SPENCER LEM. **Alabastra diversa. Part XXXIV. (1) Plantae Rogersianae VI.** Jour. Botany 59: 226–232. 1921.—This is a further installment regarding Archdeacon Roger's plants collected in Africa. The following species are described for the first time: *Pelargonium Rogersii*, *Rhus tumulicola*, *Combretum griseiflorum*, *Dactylopetalum Rogersii*, *Oldenlandia Rogersii*, *Felica homochroma*, *Euryops neptunicus*, *Senecio Breyeri*, *S. waterbergensis*, *Schizoglossum Theileri*, and *Selago Stewartii*. A new genus, **Tribulocarpus**, is described, to which *Tetragonia dimorphantha* is transferred as the type species. *Helichrysum Swynnertonii* S. Moore is reported for the 1st time from South Africa, and *Dicoma Kirkii* Harv. var. *microcephalus* is described as a new variety. A new Euphorbia is noted under the hitherto monotypic genus *Paivaeusa*, but, as only a fruiting specimen was seen, it was not described.—*Adele Lewis Grant.*

2030. PENNELL, FRANCIS W. **"Veronica" in North and South America.** Rhodora 23: 1–22. 1921.—The author revises the species of "Veronica" of both North and South America,

including the known naturalized species, and attempts to group the species in an evolutionary sequence. After discussing the critical characters in each of the genera and subgenera, and the age and distribution of various species, he gives a key to the genera and subgenera. The bibliography, synonymy, distribution, and discription of each of the species follows the key. The article is to be continued, this installment covering the genus *Veronicastrum* and the subgenus *Veronicella* of the genus *Veronica*. The species here treated are: *Veronicastrum virginicum* (L.) Farwell, *Veronica maritima* L., *V. spicata* L., *V. mexicana* S. Wats., *V. Copelandii* Eastw., *V. Cusickii* A. Gray, *V. fruticans* Jacq., *V. alpina* L., *V. Stelleri* Willd., *V. Wormskjoldii* Roem. & Schult., *V. Wormskjoldii nutans* (Bong.) Pennell comb. nov., *V. serpyllifolia* L., *V. serpyllifolia humifusa* (Dickson) Vahl., *V. peregrina* L., *V. peregrina xalapensis* (HBK.) Pennell, *V. arvensis* L., *V. agrestis* L., *V. polita* Fries, *V. persica* Poir., *V. biloba* L., *V. hederaefolia* L. A key to the latter group is given.—*James P. Poole.*

2031. Pennell, Francis W. **"Veronica" in North and South America.** Rhodora 23: 29–41. 1921.—This, the concluding portion of the revision of the species of "Veronica," covers the species of the subgenus *Euveronica*, as follows: *V. latifolia* L., *V. Chamaedrys* L., *V. javanica* Blume, *V. grandiflora* J. Gaertn., *V. officinalis* L., *V. Beccabunga* L., *V. americana* Schwein., *V. Anagallis-aquatica* L., *V. Anagallis-aquatica Brittonii* (Porter) Pennell comb. nov., *V. glandifera* Pennell, *V. catenata* Pennell sp. nov., *V. catenata glandulosa* (Farwell) Pennell comb. nov., *V. undulata* Wall., *V. scutellata* L. The article also covers the genus *Hebe*, with the following species: *H. salicifolia* (Forst.) Pennell comb. nov., *H. blanda* (Cheesm.) Pennell comb. nov., *H. elliptica* (Forst.) Pennell comb. nov. The article closes with a list of Nomina Excludenda.—*James P. Poole.*

2032. Petrie, D. **Descriptions of new native flowering-plants.** Trans. and Proc. New Zealand Inst. 52: 17–19. 1920.—The following new species, varieties, and combinations are made: *Pittosporum Matthewsii*, *Uncinia longifructus* (Kük.), *Uncinia caespitosa* Col. var. *collina*, *Carex secta* Boott var. *tenuiculmis*, *Poa novae-zelandiae* Hackel var. *Wallii*.—*Wm. Randolph Taylor.*

2033. Pfeiffer, Hans. **Über die Stellung der Gattung Caustis R. Br. im natürlichen System. II. [On the position of the genus Caustis in the natural system.]** Ber. Deutsch. Bot. Ges. 38: 207–216. *Fig. 1.* 1920.—Having, in an earlier paper, given the grounds for including the genus *Caustis* in the Cyperaceae, the author in this paper deals with the position of the genus in the family. He concerns himself with 3 questions: Does *Caustis* belong to the tribe *Gahnieae?* Is this tribe to be retained unchanged or is it to be extended to include several other genera of the *Rhynchosporeae?* If the latter is the case, to what grouping of genera would its extended position most nearly correspond? Each of these questions is discussed at length. A very complete key to the genera is given, based mainly on the bristles of the spikelet and the fruit. The subfamily includes the tribes *Schoeneae*, *Rhynchosporeae*, and *Cladieae*; the genus *Caustis* is placed in the last mentioned tribe.—*P. B. Kennedy.*

2034. Pittier, Henry. **Notes on the genus Swartzia in Panama and Guatemala.** Jour. Washington [D. C.] Acad. Sci. 11: 155–160. 1921.—The genus is revised and the following species are described: *Swartzia panamensis* Benth., *S. simplex* Spreng., *S. arborescens* (Aubl.) Pittier, *S. trifolia* sp. nov., *S. myrtifolia* J. E. Sm., *S. darienensis* sp. nov., *S. guatemalensis* (Donn. Sm.) Pittier.—*Helen M. Gilkey.*

2035. Pittier, Henry. **Two new species of Bursera.** Jour. Washington [D. C.] Acad. Sci. 11: 229–230. 1921.—Both species, *Bursera panamensis* and *B. verapacencis*, are from Central America.—*Helen M. Gilkey.*

2036. Pole Evans, I. B. **The Flowering Plants of South Africa.** 1: *Pl. 21–40.* 1921.—The number contains colored plates of *Pachypodium succulentum*, *Protea abyssinica*, *Bolusanthus speciosus*, *Acokanthera spectabilis*, *Cyrtanthus sanguineus*, *C. McKenii*, *C. obliquus*, *C. rotundifolius* sp. nov., *Stapelia Gettleffii*, *Streptocarpus Dumii*, *Senecio stapeliaeformis* sp. nov., *Nymphaea stellata*, *Ceropegia Meyeri*, *C. Rendallii*, *Moraea iridioides*, *Haemanthus*

natalensis, Witsenia maura, Mimetes palustris, Orothamnus Zeyheri, and *Sarcocaulon rigidum.* —*E. P. Phillips.*

2037. PUGSLEY, H. W. **A mountain form of Carex pulicaris.** Jour. Botany 59: 106–109 1921.—An unusual sedge growing on mountain cliffs in Great Britain is described as *Carex pulicaris* forma *montana.*—*Adele Lewis Grant.*

2038. PUGSLEY, H. W. **Spergularia marginata var. glandulosa Druce.** Jour. Botany 59: 130–131. 1921.—The author gives his reasons for maintaining that this is a good variety, and proposes *S. marginata* var. *glandulosa* forma *glabrescens* as a new form.—*Adele Lewis Grant.*

2039. PUGSLEY, H. W. **British forms of Jasione montana L.** Jour. Botany 59: 209–216. 1921.—Descriptions of the forms and varieties of *Jasione montana* L. are given, and *J. montana* forma *laevis* and *J. montana* var. *latifolia* are described as new.—*Adele Lewis Grant.*

2040. SAFFORD, WILLIAM E. **Synopsis of the genus Datura.** Jour. Washington [D. C.] Acad. Sci. 11: 173–189. *Fig. 1–3.* 1921.—The author describes the following species: *Datura Stramonium* L., *D. ferox* L., *D. quercifolia* HBK., *D. villosa* Fernald, *D. Metel* L., *D. innoxia* Mill., *D. meteloides* Dunal, *D. discolor* Bernh., *D. pruinosa* Greenm., *D. ceratocaula* Ort., *D. candida* (Pers.) Safford, *D. cornigera* Hook., *D. arborea* L., *D. versicolor* (Lagerh.) Safford, *D. mollis* sp. nov., *D. rubella* sp. nov., *D. suaveolens* Humb. & Bonpl., *D. affinis* sp. nov., *D. dolichocarpa* (Lagerh.) Safford, *D. longifolia* (Lagerh.) Safford, *D. aurea* (Lagerh.) Safford. *D. Pittieri* sp. nov., *D. sanguinea* Ruiz & Pavon, *D. Rosei* sp. nov. A key to the species of the sections *Stramonium, Dutra, Ceratocaulis,* and *Brugmansia* is given.—*Helen M. Gilkey.*

2041. SALMON, C. E. **Epipactis viridiflora Reichb.** Jour. Botany 59: 20–21. 1921.—This is an account of certain peculiar plants of *Epipactis* found in the counties of East and West Gloucester, and Monmouth, England, in 1920. They probably represent the typical *E. viridiflora,* and not forma *dunensis* or forma *vectensis.* Possibly they are var. *leptochila* of Godfery. The British forms of *Epipactis* may be arranged as follows: *E. viridiflora* Reichb. forma *vectensis* T. & T. A. Stephenson; var. *dunensis* (T. & T. A. Stephenson) n. comb.; and var. *leptochila* Godfery.—*K. M. Wiegand.*

2042. STEPHENSON, T., AND T. A. STEPHENSON. **Epipactis latifolia in Britain.** Jour. Botany 59: 33–39. *1 fig.* 1921.—This is a continuation of the discussion by the present and other authors of the status of forms related to *E. latifolia* All. The occurrence of *E. latifolia* in a locality where *E. viridiflora* did not occur showed that forms classed as *E. media* Fries are simply variations of *E. latifolia* and should be considered as such, not as hybrids. These plants were very variable and the different forms are discussed. Variation in flower color is not due to shade. It is shown that the name *E. media* Fries or Babhington is untenable.—*K. M. Wiegand.*

2043. STEPHENSON, T., AND T. A. STEPHENSON. **The forms of Orchis maculata.** Jour. Botany 59: 121–128. *1 pl., fig. 1–25, 2 text fig.* 1921.—The authors give a detailed discussion of the several forms of *O. maculata* L. occurring in Great Britain.—*Adele Lewis Grant.*

2044. STEPHENSON, T., AND T. A. STEPHENSON. **Epipactis viridiflora.** Jour. Botany 59: 205. 1921.—The note refers to Godfery (see Bot. Absts. 10, Entry 2023), transferring to *E. leptochila* Godfery the *f. vectensis* and *f. dunensis* as varieties of that species.—*S. H. Burnham.*

2045. THOMPSON, H. STUART. **Carex pulicaris forma montana.** Jour. Botany 59: 146. 1921.—The author adds further notes to H. W. Pugsley's description (see Bot. Absts. 10, Entry 2038) of this form.—*Adele Lewis Grant.*

2046. TURRILL, W. B. **Glechoma hederacea L. and its subdivisions.** Bot. Soc. and Exchange Club British Isles Rept. 5: 694–701. 1919 [1920].—A new form, *parvifolia,* from Berkshire, England, is included.—*G. C. Druce.*

2047. Wall, A. **Helichrysum dimorphum Cockayne—a hybrid?** Trans. and Proc. New Zealand Inst. 52: 106-107. 1920.—The writer visited the original localities from which this plant was obtained by Cockayne, and found it associated with *Helichrysum filicaule* and *H. depressum*. On the basis of morphological resemblances to the associated species, he would consider it a hybrid between them. In habit, *H. dimorphum* most resembles *H. filicaule* in infloresence, *H. depressum*. Extensions of range of the form are given.—*Wm. Randolph Taylor*.

2048. Wiegand, K. M. **The genus Echinochloa in North America.** Rhodora 23: 49-65. 1921.—As the result of an extended investigation, the author publishes a treatment of this genus, for the region north of Panama, differing widely from the recent revision of the genus by Hitchcock (see Bot. Absts. 8, Entry 724). The characters used to define the groups are: Size and form of spikelets, size and nature of spinules, and length of anther. In the latter character, the results of several hundred measurements show a remarkable constancy of size for each species and variety. A key is given for the following species, varieties, and forms: *E. colonum* (L.) Link, *E. colonum* forma *zonalis* (Guss.) comb. nov., *E. zelayensis* (HBK.) Schult., *E. zelayensis* var. *macera* var. nov., *E. zelayensis* var. *subaristata* var. nov., *E. frumentacea* (Roxb.) Link, *E. crusgalli* (L.) Beauv., *E. crusgalli* forma *longiseta* (Trin.) Farwell, *E. muricata* (Michx.) Fernald, *E. muricata* var. *ludoviciana* var. nov., *E. muricata* var., *occidentalis* var. nov., *E. muricata* var. *microstachya* var. nov., *E. muricata* var. *multiflora* var. nov., *E. echinata* (Willd.) Beauv., *E. echinata* var. *decipiens* var. nov., *E. Walteri* (Pursh) Nash, *E. Walteri* forma *laevigata* forma nov., *E. oplismenoides* (Fourn.) Hitchcock, *E. Holciformis* (HBK.) Chase, *E. polystachya* (HBK.) Hitchcock, *E. guadeloupensis* (Hackel) comb. nov., *E. paludigena* sp. nov., *E. paludigena* var. *soluta* var. nov. The description, distribution, synonymy, and bibliography of each form is given, as well as many short discussions concerning relationships.—*James P. Poole*.

2049. Wilmott, A. J. **Geranium purpureum T. F. Forster.** Jour. Botany 59: 93-101. 1921.—This is a discussion of the varieties of *Geranium purpureum* and *G. Robertianum* occurring in England. The *G. purpureum* of Forster is considered to be a variety and is named *G. purpureum* var. *Forsteri*. *G. Robertianum* var. *intermedium* is described as new.—*Adele Lewis Grant*.

MISCELLANEOUS, UNCLASSIFIED PUBLICATIONS

Burton E. Livingston, *Editor*
Sam F. Trelease, *Assistant Editor*

2050. Anonymous. **A new Natal sugar cane cutter.** South African Sugar Jour. 5: 713-715. *1 fig.* 1921.—An illustrated description and explanation is given of a sugar-cane cutting machine invented by Percy Woodland.—*C. Rumbold*.

2051. Anonymous. **Endowment of scientific research in the United States.** [Rev. of: Anonymous. **Funds available in 1920 in the United States of America for the encouragement of scientific research.** Nation. Res. Council [U. S. A.] Bull. 9. 1921.] Nature 107: 719-720. 1921.—Amount and distribution of funds, with some comment on similar work in Europe, are discussed.—*O. A. Stevens*.

2052. Anonymous. **The alternation of generations.** Sci. Amer. Monthly 3: 405-408. 1921.

2053. Baño, José de. **Ultimos ensayos en la extraccion de la cera de candelilla. [Experiments in the extraction of wax from "candelilla."]** Rev. Agric. [Mexico] 5: 822-824. *2 fig.* 1921.—A method of obtaining a wax of high grade, free of all impurities, is described. The plant used is *Pedilanthus pavonius*.—*John A. Stevenson*.

2054. COTTRELL, K. W. **Production of peat in 1920.** Jour. Amer. Peat Soc. 14[4]: 4-7. 1921.—The value in dollars of peat and peat moss used in the manufacture of peat products in the U. S. A. in 1920 was: Fertilizer and fertilizer ingredient, 773, 635; stock food, 143,047; fuel, 5,050; moss (largely for packing), 36,201.—*G. B. Rigg.*

2055. GEORGESON, C. C. **Summary of the work at the stations.** Rept. Alaska Agric. Exp. Sta. 1918: 7-21. *Pl. 1-2.* 1920.—This report gives a brief review of the work done at the Rampert, Fairbanks, Matanuska, and Kodiak stations, and a brief summary of homesteads in Alaska.—*J. P. Anderson.*

2056. GEORGESON, C. C. **Summary of work at the stations.** Rept. Alaska Agric. Exp. Sta. 1919: 7-19. *Pl. 1-2.* 1920.—This report gives a general survey and a review of the work done at the 5 experiment stations in Alaska. The reports, in the same volume, of the station superintendents describe the work in greater detail [see abstracts under Agronomy and Horticulture].—*J. P. Anderson.*

2057. HILL, C. L. **Combating marine borers in San Francisco Bay.** Intercoll. Forest. Club Ann. 1: 38-42. *Fig. 2.* 1921.

2058. KAISER, GEORGE B. **Little journeys into mossland. IV.—The luminous moss.** Bryologist 24: 41-43. 1921.—This is a popular account of a search for the luminous moss (*Schistostega osmundacea*) in Vermont and New Hampshire.—*E. B. Chamberlain.*

2059. MARCHMAY, T. A. **What is manna?** Sci. Amer. Monthly 3: 414. 1921.—A comparison is given of the different kinds of modern manna with the biblical food.—*Chas. H. Otis.*

2060. MARTIN, EDWD. A. **The generation of heathfires.** Nature 107: 811. 1921.—The author reports an area of peaty soil smoking from natural heat of the sun.—*O. A. Stevens.*

2061. PEARSE, A. S. **Distribution and food of the fishes of Green Lake, Wis., in summer.** Bull. U. S. Bur. Fish. 37: 253-272. 1921.—Only a very small percentage of the direct food is composed of algae and other plants.—*T. C. Frye.*

2062. PLATT, E. E. **List of food plants of some South African lepidopterous larvae.** South African Jour. Nat. Hist. 3: 65-138. 1921.—Two lists have been compiled, the 1st an alphabetical list of food plants, the 2nd a systemised list of the butterflies and moths, with the names of the food plants on which the corresponding larvae have been observed to feed.—*E. M. Doidge.*

2063. RYAN, HUGH. **The exploitation of Irish peat.** Nature 107: 728-730. *1 fig.* 1921.—Machinery for cutting and handling peat, illustrated by the Baumann automatic peat machine, is referred to.—*O. A. Stevens.*

2064. SCHIPPER, W. W. **Het hard koken van erwten.** [**Hard boiling of peas.**] Cultura 33: 265-267. 1921.

2065. WILLIAMS, S. G. **Manufacture of rope and twine.** Sci. Amer. Monthly 3: 349-352. *9 fig.* 1921.—Treatment of Manila hemp, sisal, and jute in a modern rope factory is described. —*Chas. H. Otis.*

2066. YUNCKER, T. G. **A handy method for the mounting of mosses.** Bryologist 24: 43-44. *3 fig.* 1921.—"The method consists of folding pieces of paper into the form of envelopes so that when mounted the specimen is held securely, is visible, and at the same time can be easily removed for further study."—*E. B. Chamberlain.*

INDEX TO AUTHORS' NAMES IN VOLUME X

(References are to entry numbers; an asterisk before a number signifies that the entry referred to is by citation only)

Acree, S. F. (Mellon R. R., Acree, P. M. Avery, and E. A. Slagle). 262.
Acree, S. F., R. R. Mellon, P. M. Avery, and E. A. Slagle. 311.
Adams, C. C. (Moore, B., Adams, T. L. Hankinson, G. P. Burns, and N. Taylor). *985.
Addis, J. M. 1099, 1183.
Adolph, E. F., and R. M. Ferry. 1957.
Agar, M. (Stout, M., and Agar). 164.
Agelasto, A. M. 386.
Agharkar, S. 462.
Agrelius, F. U. G. 418, 577.
Ahlefeldt-Laurvig, C. W. (Götsche, O., F. Kiörbie, C. Bistrup, and Ahlefeldt-Laurvig). 51.
Albertoni, I., and G. Bosinelli. 1929.
Albertson, A. O. 1385.
Alexander, J. 1919.
Allen, E. J. 592.
Allen, R. F. 1285.
Allen, R. H. 150.
Allen, W. E. 948.
Allen, W. J. *151, 1676.
Allen, W. J., and R. G. Bartlett. *1100.
Allorge, A. P. 601.
Alps, H. F., and O. H. Hammonds. *949.
Altenburg, E. (Muller, H. J., and Altenburg). *1043.
Alverdes, F. *511, *512, *513, *514.
Alviella, F. G. d'. 1611.
Alway, F. J., P. R. McMillen, and C. O. Rost. 1978.
Ames, O. 816.
Anastasia, G. E. 72.
Anderson, R. J. 1930.
Andre, H. 767.
Andrews, A. LeR. 1533.
Andrews, E. F. 463.
Angelis d'Ossat, G. de. 1324, 1979.
Anthony, S. (Harlan, H. V., and Anthony). 93.
Aoi, K. 1875.
Appleman, C. O., and S. V. Eaton. 303.
Arana, M. de 1455.
Arber, A. *331, *646, 1534, 1816.
Archer, E. 44, *45.
Armin, von. 1456.
Army, A. C. 1140.
Arnell, H. W. 1535.
Arnold, H. H. 1612.
Arnold, R. (Bridel, M., and Arnold). 1932.
Arthur, J. C. 25, 1273.
Artschwager, E., and E. M. Smiley. 1438.
Ashe, W. W. 2011.
Ashton, P. J. *1601.
Ashworth, J. H. *849.
Aston, B. C. 864.
Astre, G. *950.
Atkins, W. R. G. 553.
Aumiot, J. 1034.
Avery, P. M. (Acree, S. F., R. R. Mellon, Avery, and E. A. Slagle). 311.
Avery, P. M. (Mellon, R. R., S. F. Acree, Avery, and E. A. Slagle). 262.
Ayers, S. H., P. Rupp, and C. S. Mudge. 1250.
Ayyangar, M. O. P. 583.

B. *734, *780, 1613.
Babcock, E. B. 73, 923.
Babe, E. *1439.
Bailey, C. H. 286.
Bailey, D. L. (Fraser, W. P., and Bailey.) 1282.
Bailey, J. W. 477.
Bailey, L. H. 336.
Bailhache, G. (Rivière, G., and Bailhache). *1112.
Bailly, P. (Sartory, A., and Bailly). 307.
Baines, E. A. *1976.
Baker, E. 1457.
Bakke, A. L., W. A. Radspinner, and T. J. Maney. 152.
Ballard, C. W. *1602.
Bally, W. 1035.
Balme, J. 1458. 1751.
Bancroft, W. D. 312, 380, *735, *757, *850.
Bandi, W. (Volkart, A., A. Grisch, and Bandi). 917.
Baño, J. de. 1794, 1806, 2053.
Barnhart, J. H. 811.
Barnhart, P. D. 1141.
Barnola, J. M. de. 478.
Barrett, L. A. *1614.
Barthe, A. E. 207.
Bartlett, H. H. (Sando, C. E., and Bartlett). 1942.
Bartlett, R. G. (Allen, W. J., and Bartlett). *1100.
Bartos, W. 515.
Bataille, F. 1204.
Bataillon, C. 1677.
Bateson, W. 177, 516, 1678.
Bather, F. A. 415.
Baudyš, E. 722.
Bauer, F. C. 1367.
Baur, E. *1043.
Baxter, S. N. 1142, 1143.
Beach, F. H. 702.
Beach, W. S. *208, 1876.
Bean, W. J. 479.
Beath, O. A. 1905, 1906, 1907.
Beauvard, G. *822.
Beauverie, J. 444, 1871.
Beauvisage, M. *841.

Bechhold, H. *734.
Beckley, V. A. *1983.
Beguinot, A. *1563.
Behrens. *1036.
Behrens, J. 616.
Bell, W. H. 1931.
Belling, J. (Blakeslee, A. F., Belling, and M. E. Farnham). *1043.
Benaiges de Arís, C. 1752.
Bennet, I. D. *1144.
Bennett, A. 1395, 2012.
Bennett, C. W. (Young, H. C., and Bennett). *672.
Benoist, R. 801, 1396, 1397, 1398.
Benson, C. H. 1753.
Benson, C. H. (Georgeson, C. C., and Benson). 1762.
Bentley, J., Jr. (Recknagel, A. B., and Bentley). 43.
Bernatsky, J. 703.
Berry, E. W. 634, 635, 1263.
Berry, R. A., and D. G. O'Brien. 1679.
Bertolo, P. *1339, 1340.
Bertrand, G., and P. Thomas. 255.
Bethel, E. *184.
Bethel, E., and G. B. Posey. *673.
Betscher, C. 1178.
Bettinger, and Delaval. *1359.
Betts, M. W. 1817, 1818.
Bevan, W. 865, 866, 867, 868, 1010, 1101, 1102, 1145, 1179, 1330, 1440.
Bewley, W. F., and H. B. Hutchinson. 1251.
Bews, J. W. 467, 802, 979.
Bezssonoff, N. (Truffaut, G., and Bezssonoff). 320.
Bhatnagar, S. S. 790.
Bianchi, A. T. 1894.
Bibb, L. B. 297.
Bijl, P. A. van der. 1853.
Bioletti, F. T. 1103.
Bioret, G. *626.
Bippart, E. 387.
Birmingham, L. E. 554.
Birmingham, W. A. 209.
Bisby, G. R. *210, *228, 1303.
Bishop, E. (Burton, E. F., and Bishop). 736.
Bishop, O. F., J. Grantham, and M. J. Knapp. *1037.
Bistrup, C. (Götsche, O., F. Kiörbie, Bistrup, and C. W. Ahlefeldt-Laurvig). 51.
Blackman, F. F. 267.
Blackman, V. H. *252.
Blair, A. W. 1992.
Blair, A. W. (Lipman, J. G., and Blair). 1375.
Blair, E. C. (Williams, C. B., W. F. Pate, Blair, and R. W. Collett). 410.
Blair, R. J. 1304, 1305.
Blake, S. F. 337, 817, 818, 1399, 2013.
Blakeslee, A. F. 74, 517, *522, *523, 1038, 1041, *1043, 1680.
Blakeslee, A. F. (Harris, J. A., W. F. Kirkpatrick, Blakeslee, D. E. Warner, and L. E. Card). 1056.
Blakeslee, A. F., J. Belling, and M. E. Farnham *1043.
Blanc, J. (Dernby, K. G., and Blanc). 1962.
Blanck, E., and F. Preiss, 1980.
Blandenier, A. E. 518.
Blaringhem, L. 75, *432, 519, 520, 1039, 1040, 1092, 1681.
Blatter, E. and F. Hallberg. 338.
Blatter, E., F. Hallberg, and C. McCann. 819.
Bliss, A. J. 1682.
Block, A. 2.
Block, E. 1819.
Blodgett, F. M., and K. Fernow. *704.
Blossfeld, R. 1536.
Boas, S. 1947.
Bolton, E. 970.
Bonaparte, R. 1537.
Bonazzi, A. 1961.
Bondorff, K. A. (Weis, F. and Bondorff). 665, 1383.
Bonnier, G. 339, 464.
Bonvallet, E. 165.
Böös, G. 1820.
Bornemann, O. Lemmermann, Gerlach, and F. Riedel. 1459.
Bornemann, C. E. 1615.
Bosinelli, G. (Albertoni, I., and Bosinelli). 1929.
Botjes, J. O. (Quanjer, H. M., and Botjes). 1885.
Bottazzi, F. *851.
Boulenger, E. G. 1683.
Bourdot, H. 1205.
Bourdot, H., and A. Galzin. 1206.
Bourdot, H., and L. Maire. *1207.
Bourquelot, E., and Bridel. 278.
Boutwell, P. W. (Steenbock, H., M. T. Sell, and Boutwell). 1943.
Bovet, P. A. 1460, 1461, 1754.
Bowman, H. H. M. *941, 1684.
Breakwell, E. 869, 870, 871.
Breckenridge, J. E. 791.
Brewster, A. A. *465.
Bridel. (Bourquelot, E., and Bridel). 278.
Bridel, M., and R. Arnold. 1932.
Bridges, C. B. 76, 77, *1043, 1685.
Bridges, C. B. (Morgan, T. H., A. H. Sturtevant, and Bridges). 108.
Briggs, F. N. (Mackie, W. W., and Briggs). *237.
Briggs, G. E. (West, C., Briggs, and F. Kidd). 296.
Briggs, H. H. 78, 79.
Briquet, J. 178, 179.
Britten, J. 1538, 1539, 1540, 1541, 1542, 1543, 1544, 2014.
Britton, C. E. 1386.
Britton, E. G. 602.
Britton, N. L. 480.
Britton, N. L., and C. F. Millspaugh. *332, *1999.
Britton, N. L., and J. N. Rose. 340, 1400.
Broadbent, W. H. 674.
Brock, J. A. 1290.

Brock, W. S. 229.
Brockmann-Jerosch, H. 1545.
Broili, J. 1686.
Brooks, C. 555.
Brooks, F. T. 1687.
Brooks, M. M. 287, 288.
Brown, H. D. 572.
Brown, J. H. 1333.
Brown, N. C. 43, 1616.
Brown, N. E. 1400.
Brown, P. E. 872.
Browne, I. M. P. 1821.
Bruce, D. *46, 1011.
Brumpt, E. 1688.
Bruner, S. C. 1854, 1855. 1856.
Bruner, S. C. (Fortún, G. M., and Bruner). 1286.
Bruno, A. 1462.
Brunswick, H. 752.
Buchet, S., H. Chermezon, and F. Evrard. 1261.
Buckmaster, G. A. 1958.
Bucura, C. *536.
Buell, M. (Steenbock, H., M. T. Sell, and Buell). 1944.
Bugnon, P. 1281.
Bühler, A. 1012.
Buller, A. H. R. 1355.
Bunyard, E. A. 1546, 1755.
Burgess, K. E. 781.
Burkholder, C. L. *1146.
Burkill, I. H. 873, 1147, 1368.
Burns, G. P. *243.
Burns, G. P. (Moore, B., C. C. Adams, T. L. Hankinson, Burns, and N. Taylor). *985.
Burns, W., and P. G. Joshi. 1807.
Burns, W., and L. B. Kulkarni. 556.
Burton, E. F., and E. Bishop. 736.
Buscalioni, L., and G. Muscatello. 1401.
Busch, W. 1197.
Büsgen, M. 1868.
Butler, O. M. *1617.

C., G. H. *521.
C., J. 1547.
Caesar, L. *1325.
Caille, O., and H. Poisson. *1402.
Calvino, E. M. de. 1463.
Calvino, M. 3, 874, *875, *876, 877, 878, 879, 880, *1104, 1464, 1756.
Camp, W. B. 388.
Campbell, D. H. 180, 924.
Camus, A. 1403, 1404, 1405, 1406, 1407.
Canals, E. 1925.
Canfield, F. D., and A. G. Rios. 881.
Cannon, W. A. *951.
Card, L. E. (Harris, J. A., W. F. Kirkpatrick, A. F. Blakeslee, D. E. Warner, and Card). 1056.
Cardinell, H. A. 557.
Cardot, J. 1408.
Caron, von. 80.
Carothers, E. E. 81.
Carpentier, A. *636, 1847.
Carrero, J. O. (Gils, P. L., and Carrero). 1336.
Căruntu, D. 419.
Casale, L. 737, 738, 739.
Casares-Gil, A. 606.
Cash, L. C. (Rand, F. V., and Cash). 203.
Caspers, A. C. 1908.
Castle, W. E. *521, 1689, 1690, 1691.
Castle, W. E., and W. L. Wachter. 1691.
Cathcart, P. H., (Esty, J. R., and Cathcart). 304.
Cauda, A., and C. Mensio. 740.
Cedergren, G. R. 2015.
Chamberlain, C. J. *83.
Chamberlain, E. B. 1836.
Chambers, H. (Parker, W. H., and Chambers) *400.
Chambers, W. H. 1360.
Chance, H. C. (Elliott, J. S. B., and Chance). 1210.
Chandler, M. E. J. 1848.
Chaney, R. W. 1264.
Chase, A. 341.
Chasset, L. 153, 154, 1757.
Chauveaud, G. 578.
Chauvin, E. 942.
Cheel, E. 342.
Cheeseman, T. F. 2000.
Chenantais, J. E. 1208.
Chermezon, H. (Buchet, S., Chermezon, and F. Evrard). 1261.
Chibnall, A. C., and S. B. Schryver. 1948.
Chifflot, J. 658.
Child, C. M. 302.
Chipp, T. F. 1274.
Choux, P. 1409.
Christian, H. B. *1981.
Christie, A. W. (Cruess, W. V., and Christie). 1180.
Church, A. H. 1849.
Ciamician, G., and C. Ravenna. 1341, 1342, 1361.
Clark, J. 47.
Clark, W. M. *735.
Clark, W. M. (Zoller, H. F., and Clark). 275.
Clarke, S. R. 1148.
Clausen, R. E. (Setchell, W. A., T. H. Goodspeed, and Clausen). 1085.
Clausen, R. E., and T. H. Goodspeed. 1692.
Claussen, P. *522, *523, *1041.
Clayton, W. *850.
Cleghorn, H. 1387.
Coburn, L. H. 481.
Cockayne, A. H. 1275.
Cockayne, L. 882, 883.
Colani, M. 637, 638, 639, 640.
Colin, M. H. 1356.
Colizza, C. 675.
Collett, R. W. (Williams, C. B., W. F. Pate, E. C. Blair, and Collett). 410.
Collins, J. L. 1042, 1693, 1694.
Conceição, J. 420.
Conrad, W. 584.
Cook, I. W., H. Schmitz, and L. A. Grant. 507.
Cook, M. (Kendall, A. I., Cook, and M. Ryan). 1257.
Cook, M. T. *676, *1291, *1594, *1601.

Cook, O. F. *524, 525.*
Cook, R. C. (Cook, O. F., and Cook). 525.
Coolidge, P. T. *1618.
Coons, G. H., and R. Nelson. *211.
Cooper, J. R. 155.
Copeland, E. B. *149, *551.
Coppa, A. 1982.
Corbould, M. K. 884.
Correia Mendes, F. C. 1465.
Correns, C. 82, *111.
Costantin, J. 1188.
Costerus, J. C. 1189.
Cottrell, K. W. 2054.
Coulter, M. C. *526, **1043.*
Coupin, H. 585, 586, 587, 588, 589, 590.
Couturier, H. (Lumière, A., and Couturier). 310.
Coville, F. V. *777, 1695.
Cowles, H. C. 971.
Cowperwaite, W. T. *1149.
Crahay, N. I. *1619, 1620.
Craig, W. T. (Love, H. H., and Craig). 1731.
Cratty, R. I. 980.
Crawford, R. F. *190.
Crespo, U. 1758.
Crooks, J. T. J. 885.
Cross, W. E. 1306, 1466, *1467, 1468, 1469, 1470,* 1471, 1472, 1473.
Crouzel, E. 314.
Crow, J. W. 433.
Crowell, S. W. *1150.*
Cruess, W. V. 558.
Cruess, W. V., and A. W. Christie. 1180.
Cryer, J. *803.
Cumming, M. 26.
Cunningham, C. C. 1044.
Cunningham, J. C. 852.
Cunningham, M. P. *1151.
Cutler, D. W. 792.
Cutler, G. H. 4.
Cutting, E. M. 1822, 2016.
Czaja, A. T. *83, *1045.
Czapek, F. 1933.

D., C. 253, *741, *742.
D., H. D. 1152.
Dacy, G. H. 1972.
Damon, S. C. 389.
Damon, S. C. (Hartwell, B. L., and Damon). 394, 573.
Dana, B. F. 1877.
Dangeard, P. 445.
Danguy, P. 1410, 1411.
Daniel, L. 1696.
Daniels, A. S. (Schmitz, H., and Daniels). 509.
Danser, B. H. 820.
Darlington, H. T. 482.
Darrow, G. M. 1046.
Davidson, J. D. 508.
Davies, D. 641.
Davies, E. C. 723.
Davis, D. J. 268.
Davis, H. P. 1697.
Davis, K. B. (Fernald, M. R., M. H. S. Hayes, and A. Dawley). 1049.
Davis, W. A. 315.
Davis, W. H. 1878.
Davy de Virville, A. 981.
Davy de Virville, A., and R. Douin. 603.
Dawkins, C. G. E. 48.
Dawley, A. (Fernald, M. R., M. H. S. Hayes, and Dawley). 1049.
Deam, C. C. 1650, 2003.
Deane, W. (Knowlton, C. H., and Deane). 327.
Dearing, C. 527.
Decary. 2010.
Delaval. (Bettinger, and Delaval). *1359.
Denham, H. J. 181.
Denis, M. 579.
Denny, M. (Payne, F., and Denny). 1734.
Dental, J. B. 1776.
Dernby, K. G., and J. Blanc. 1962.
Deshmukh, G. B. 1184.
Detlefsen, J. A. 1698.
Detwiler, S. B. 1307.
Dezani, S. 758.
Dickson, B. T. 1292.
Dickson, J. G. *191.
Dickson, J. G., H. Johann, and G. Wineland. *677.
Dixon, H. N. 1837.
Doblas, J. H. 1474.
*Dodge, C. W. (Duggar, B. M., and Dodge). *1946.
Doidge, E. M. 1857.
Domingo, M. G. 1795.
Donk, P. J. 1252.
Doolittle, S. P. *192, *193.
Dorsey, M. J. 84, *1759.
Douglass, A. E. 952.
Douin, C. 1838.
Douin, R. 604.
Douin, R. (Davy de Virville, A., and Douin). 603.
Dowling, J. J. 768.
Downing, A. J. 1777.
Draghetti, A. 1963.
Dragoiu, J. (Vles, F., and Dragoiu). 458.
Dragoiu, J., and F. Vles. 446.
Drechsler, C. *185.
Drion, R. 1621, 1622.
Druce, G. C. *390, *559, *642, *804, *805, *806, *821, *822, *823, *824 *1388, *2001, *2017.
Druce, G. C. (Hayward, I. M., and Druce). *1394, 2004.
Ducomet, V. 659, 886.
Duddleston, B. H., and G. N. Hoffer. *230.
Dudgeon, W. *447, 468.
DuFour, L. 421.
Duggar, B. M. 1335, 1343.
Duggar, B. M., and C. W. Dodge. *1946.
Duley, F. L., and M. F. Miller. 316.
Dunbar, J. 1153.
Dunn, L. C. 1699.
Dupont, G. 269.
Durham, H. E. 1548.
Durst, C. E. *560.
Dusén, P., and F. W. Neger. 1823.
Dutcher, R. A., H. M. Harshaw, and J. S. Hall. 1934.
Duthie, J. F. *343.
Duvernoy, A., and R. Maire. 1209.
Dykes, W. R. 85, 1047.

Eames E. A. 2018.
Earle, F. S. 1549.
East, E. M., and D. F. Jones. 1048.
Eaton, S. V. *1759, *1921.
Eatcn, S. V. (Appleman, C. O., and Eaton). 303.
Eberts. 1623.
Eckbo, N. B. 1624.
Eddy, W. H. 1920.
Eddy, W. H., H. R. Heft, H. C. Stevenson, and R. Johnson. 1935.
Edgerton, C. W. 1326.
Edgerton, C. W., and C. C. Moreland. 1293.
Edgerton, C. W., and G. L. Tiebout. 1308.
Edwardes, V. P. (Kress, O., S. D. Wells, and Edwardes). 1017.
Edwards, W. M. O. 1309.
Edwards, W. N. 643, 644, *645.
Eeden, F. W. van. (Kops, J., van Eeden, and L. Vuyck). *1389.
Egan, W. C. 1154.
Eggerth, A. H. 1922.
Eichwald, E., and A. Fodor. 253.
Eide, O. K. (Thjotta, T., and Eide). 1091.
Elderton, E. M. 1049.
Elderton, E. M. (Rowan, W., E. Wolff, P. L. Sulman, K. Pearson, E. Isaacs, Elderton, and M. Tildesley). 121.
Eldredge, A. G. 1155.
Ellenwood, C. W. 1105.
Elliott, J. A. *212.
Elliott, J. S. B., and H. C. Chance. 1210.
Elliott, W. T. 631.
Ellison, F. O'B. (Waller, A. D., Mrs. A. D. Waller, Ellison, and T. B. Farmer). 750.
Elveden. 1369.
Emerson, R. A. 528.
Endres, M. 1013.
Enfer, V. 156.
Ereky, K. 769.
Erwin, A. T. 705.
Erwin, A. T. (Gilman, J. C., and Erwin). *231.
Espinosa, L. 1475.
Esty, J. R. 1253.
Esty, J. R., and P. H. Cathcart. 304.
Euler, H., and P. Lindner. *759.
Euler, K. 1700.
Evans, A. H. *1412.
Evans, J. A. 561.
Everest, A. E., and A. J. Hall. 1936.
Evrard, F. (Buchet, S., H. Chermezon, and Evrard). 1261.
Eyster, L. A. 1701.
Eyster, W. H. 86, 1702.

Fagan, F. N. 562.
Fairchild, D. 529.
Fankhauser. 1625.
Fantini, N. *1760.
Farmer, T. B. (Waller, A. D., Mrs. A. D. Waller, F. O'B. Ellison, and Farmer). 750.
Farnham, M. E. (Blakeslee, A. F., J. Belling, and Farnham). *1043.
Farnsworth, W. W. 563.
Farrer, R. *559.
Farrington, E. I. *1156, *1157, *1158.
Farwell, O. A. 2019.
Fassett, N. C. 344, 345.
Fawcett, G. L. 1476, 1477, 1858, 1859, 1879.
Fawcett, H. S. 199, 305.
Fawcett, W. 1550.
Fawcett, W., and A. B. Rendle. 346, 2020.
Feldman, W. M. *542.
Ferdinandsen, C. 953, 954.
Ferdinandsen, C., and Ø. Winge. 1211.
Fernald, M. L. 347, 348, 1050.
Fernald, M. L. (Osterhout, W. J. V., R. Thaxter, and Fernald). 934.
Fernald, M. L., and H. St. John. 349.
Fernald, M. L., and C. A. Weatherby. 350.
Fernald, M. R., M. H. S. Hayes, and A. Dawley. 1049.
Fernow, K. (Blodgett, F. M., and Fernow). *704.
Ferreira, E. I. 1478.
Ferry, R. M. (Adolph, E. F., and Ferry). 1957.
Feustel, H. 1824.
Fick, I. A. R. 249.
Finckh, H. E. 483.
Fink, B. 1551.
Fisher, D. F. 1310.
Fisher, R. A. 1370.
Fitch, C. L. 580.
Fitting, H. 770.
Fitz, L. A. 5.
Fitzpatrick, T. J. 484.
Fleischmann, R. 1051.
Flippance, F. 1106.
Fodor, A. (Eichwald, E., and Fodor). 253.
Foëx, E. 660.
Folkstad, C. W. (Newcomb, E. L., C. H. Rogers, and Folkstad). 1915.
Fontanel, P. 2002.
Forbes, A. W. 1052.
Fortún, G. M. 925.
Fortún, G. M., and S. C. Bruner. 1286.
Fowler, R. A. 49.
Franck, W. J. 6.
Fraser, W. P., and D. L. Bailey. 1282.
Frateur, J. L. 87.
Frazer, C. G. 743, 782.
Frazier, W. C. (Fred, E. B., W. H. Wright, and Frazier). 1372.
Frear, W. 1993.
Freckmann, W. 1703.
Fred, E. B. 1371.
Fred, E. B., W. H. Wright, and W. C. Frazier. 1372.
Freundlich, H. 254, 744.
Friederichs, K. *1904.
Frierson, L. S. 887.
Fritch, F. E., and E. J. Salisbury. 32.
Frömbling, C. 1626.
Fromme, F. D. 1860.

Fromme, F. D., and S. A. Wingard. *194*, **706*.
Fron, and Lasnier. 1212.
Frost, J. F., and G. N. Hoffer. *195.
Fruwirth, C. 88.
Frye, T. C. 972.
Fuller, G. D. 973.
Fulmer, E. I. 783
Funkquist, H. 89.
Fyson, P. F. *617, *646, *1983, *1984.

G., R.R. *244.
Gadeceau, E. *1778.
Gager, C. S. 1077, 1964.
Gagnepain, F. 581.
Gajón, C. 1761, 1779.
Galzin, A. (Bourdot, H., and Galzin). 1206.
Gamble, J. S. 1413.
Garber, R. J. (Hayes, H. K., and Garber). 944, 1714.
Gard, M. 678.
Gardner, F. D. 1994.
Gardner, H. A. 1357.
Gardner, M. W., and J. B. Kendrick. *679, 1880, 1881.
Gardner, V. R. 564.
Gasser, G. W. 1479, 1480.
Gassner, G. 1704.
Gates, R. R. *447, *1705.
Gaumé, J. *1389.
Gay, J. 825.
Gayer, K. 1014.
Gaylord, F. C. 888.
Geilmann, W. (Seelhorst, C. von, Geilmann, and H. Hubenthal). 1987.
Geilmann, W., and A. van Hauten. 1985.
Gennys, R. H. 889.
Georgeson, C. C. 2055, 2056.
Georgeson, C. C., and C. H. Benson. 1762.
Gérardin, E. 1552.
Gerlach. 7.
Gerlach. (Bornemann, O. Lemmermann, Gerlach, and F. Riedel). 1459.
Gérome, J. 1553.
Gerretsen, F. C. 680, 1344.
Geschwind. *1015*.
Gibbons, M. (Little, C. C., and Gibbons). 104.
Gibson, H. *1159, 1185.
Giddings, N. J. 1895.
Gile, P. L., and J. O. Carrero. 1336.
Gill, W. 50.
Gillett, K. 1160.
Gilman, J. C. *213.
Gilman, J. C. (Melhus, I. E., Gilman, and J. B. Kendrick). 712.
Gilman, J. C., and A. T. Erwin. *231.
Gilmore, J. C. (Johnson, T., and Gilmore). 1267, 1268.
Ginzberger, A. 485.
Girola, C. D. *890, 1481, 1482, 1483, 1484, 1763, 1909.
Girón, E. G. 1485.
Giung, N. T. 2021.
Gleason, H. A. *943, 2003.
Gleisburg, W. 1198.
Gloyer, W. O. 214.
Goddard, H. H. 1078.
Godfery, M. J. 351, 2022, 2023.
Godfrey, G. H. (Smith, E. F., and Godfrey). 224.
Goetz, E. 1053.
Goldschmidt, R. *537, 1706, 1707, 1708.
Gonzáles Fragosa, R. 1213.
Good, E. S., L. J. Horlacher, and J. C. Grimes. 891.
Goodrich, E. W. 1709.
Goodspeed, T. H. (Clausen, R. E., and Goodspeed). *1692*.
Goodspeed, T. H. (Setchell, W. A., Goodspeed, and R. E. Clausen). 1085.
Goor, E. 1627.
Goossens, M. 2024.
Goris, A., and Vischniac. 250.
Gorman, M. W. 982.
Gortner, R. A. (Harris, J. A., Gortner, and J. V. Lawrence). 256, 745.
Gothan, W. 926.
Gothan, W., and K. Nagel. 1265.
Götsche, O., F. Kiörbie, C. Bistrup, and C. W. Ahlefeldt-Laurvig. 51.
Gouaux, C. B. 892, 1311.
Goulding, E. *390.
Gourley, J. H., and G. T. Nightingale. 1107.
Gowen, J. W. 90, 1710.
Gowen, J. W. (Pearl, R., Gowen, and J. R. Miner). 113.
Granel, J. 1486.
Grant, L. A. (Cook, I. W., H. Schmitz, and Grant). 507.
Grantham, J. (Bishop, O. F., Grantham, and M. D. Knapp). *1037.
Grantham, J., and M. D. Knapp. *1037, 1054.
Graves, E. W. 486.
Greeley, W. B. *506, 1016.
Green, A. W. 893.
Gregory, E. S. 826.
Grey, E. C., and E. G. Young. 1952.
Greyerz. H. von. 1390.
Grierson, R. *807.
Grieve, J. W. A. 52.
Griffith, J. W. 793.
Griffiths, D. 1161, 1162, *1163.
Griggs, R. F. 955.
Grimes, J. C. (Good, E. S., L. J. Horlacher, and Grimes). 891.
Grisch, A. (Volkart, A., Grisch, and W. Bandi). 917.
Guba, E. F. 1312.
Guenther, F. *1554*.
Guillaumin, A. 1414, 1415.
Guilliermond, A. 448, 947, 1214.
Guilliermond, A., and Peju. *1215*.
Guinier, P. 91.
Gundersen, A. 1391.
Gupta, S. N. 927.
Güssow, H. T. 681.
Gustafson, C. F. 2025.
Gustafson, F. G. 289.

Gutherz, S. von. 530.
Guthrie, J. D. 1628.

H., T. A. *157.
Haas, P. 724.
Haberlandt, G. *1190.
Hadden, N. G. 1262.
Haecker, V. 92, *512, 1711.
Hagedoorn, A. C. (Hagedoorn, A. L., and Hagedoorn). *1089.
Hagedoorn, A. L., and A. C. Hagedoorn. *1089.
Hagenburger, C. 1164.
Haggard, H. W., and Y. Henderson. 1959.
Haines, H. H. 352, 808, 1416.
Halban. 308.
Hall, A. J. (Everest, A. E., and Hall). 1936.
Hall, I. C. 1254, 1255, 1953, 1954.
Hall, I. C. (Randall, S. B., and Hall). 1956.
Hall, J. S. (Dutcher, R. A., H. M. Harshaw, and Hall). 1934.
Hall, T. D. 1487.
Hallberg, F. (Blatter, E., and Hallberg). 338.
Hallberg, F. (Blatter, E., Hallberg, and C. McCann). 819.
Halle, T. G. 647.
Hamblin, C. O. *232.
Hamilton, A. A. 353, *466.
Hammarsten, H. *279.
Hammatt, R. F. *1029.
Hammonds, O. H. (Alps, H. F., and Hammonds). *949.
Hankinson, T. L. (Moore, B., C. C. Adams, Hankinson, G. P. Burns, and N. Taylor). *985.
Hansen. 8.
Hansen, A. A. 391, 1441.
Hansen, D. 392.
Hansen, R. 9.
Hanson, C. 1596.
Harden, A. 255, *759.
Harlan, H. V., and S. Anthony. 93.
Harlin, R. G. 1055.
Harlow, C. M. (Lindsay, H. A. F., and Harlow). 1646.
Harms, W. 1712.
Harper, R. M. 487.
Harris, J. A., and E. W. Sinnott. 182.
Harris, J. A., R. A. Gortner, and J. V. Lawrence. 256, 745.
Harris, J. A., W. F. Kirkpatrick, A. F. Blakeslee, D. E. Warner, and L. E. Card. 1056.
Harrison, J. W. H. 94, *521.
Harrison, W. H. *1984.
Harshaw, H. M. (Dutcher, R. A., Harshaw, and J. S. Hall). 1934.
Harshberger, J. W. 928.
Hart, E. B., H. Steenbock, and C. A. Hoppert. 1926.
Harter, L. L. (Weimer, J. L., and Harter). 764, 1873, 1874.
Harter, L. L., and J. L. Weimer. 766, 1869.
Harth, E. 1796.
Hartwell, B. L. 393, 1488.
Hartwell, B. L., and S. C. Damon. 394, 573.
Harvey, E. N. *757.
Harvey, L. H. 469.
Harvey, R. B. (Weiss, F., and Harvey). 666.
Hastings, G. T. 470, 1597.
Hatfield, T. D. *1165.
Haunalter, E. 395.
Hauptmann, A. 1713.
Hauten, A. van. (Geilman, W., and van Hauten). 1985.
Haviland, M. D. 95.
Hayata, B. 1392.
Hayes, H. K., and R. J. Garber. 944, 1714.
Hayes, M. H. S. (Fernald, M. R., Hayes, and A. Dawley). 1049.
Hayward, I. M., and G. C. Druce. *1394, 2004.
Headlee, T. J. 1896.
Headley, F. B. (Scofield, C. S., and Headley). 798.
Heede, A. van den. 166.
Heft, H. R. (Eddy, W. H., Heft, H. C. Stevenson, and R. Johnson). 1935.
Hein, S. A. A. 96.
Helm, C. A. 894.
Hemmann. 1630.
Henderson, Y. (Haggard, H. W., and Henderson). 1959.
Hendrickson, A. H. 1057.
Henrard, J. T. 827.
Henrici, M. *756.
Henriot, P. 354.
Henry, A. 1631.
Henry, J. K. 1715.
Heriot, T. H. P. 895.
Hertel, H. 896.
Hertwig P. *134.
Hertz. 1632.
Hiern, W. P. 2026.
Hieronymus, G. 812.
Hiley, W. E. 53, 215.
Hill, A. V. 747.
Hill, C. L. *2057.
Hill, H. A. 434.
Hilson, G. R 531.
Himmelhaur, W. 682.
Hindle, E. *521.
Hitchcock, A. S. 325, 488, 1393.
Hitchens, A. P. 1965.
Hoag, J. R. (McCall, A. G., and Hoag). 1362.
Hoché, L., and R. Morlot. 1716.
Hodgetts, W. J. 591.
Hoehne, F. C. 1417.
Hoehne, F. C. (Schlechter, R., and Hoehne). 1429.
Hoffer, G. N. (Duddleston, B. H., and Hoffer). *230.
Hoffer, G. N. (Frost, J. F., and Hoffer). *195.
Hoffer, G. N. (Smith, G. M., and Hoffer). *716.
Hofmann, J. V. 974.
Hofmeyr, J. 1825.
Höhnel, F. 618, 619, 620.
Holben, F. J. (White, J. W., and Holben). 1988.
Holloway, J. E. 1826.
Holm, T. 828, 829, 830, 831, 1418, 1419.

Holmberg, O. R. 2005.
Holmes, E. M. 725, 726, 727.
Holmes, J. S. 1633.
Homans, G. M. 1634.
Honda, H. 1717.
Hood, G. W. *1108.
Hooker, H. D. 776.
Hooper, C. H. *565.
Hoppert, C. A. (Hart, E. B., H. Steenbock, and Hoppert). 1926.
Hopping, A. *35.
Horlacher, L. J. (Good, E. S., Horlacher, and J. C. Grimes). 891.
Horn, D. W. 1327.
Horwood, A. R. *33, *323.
Houseman, P. A. 1910, 1911.
Hovasse, R. 1718.
Howard, G. E. 1937.
Howard, M. S. 54.
Howard, S. H. (Smythies, E. A., and Howard). 65.
Howard, W. L. 435.
Howitt, J. E. 1313.
Hubenthal, H. (Seelhorst, C. von., W. Geilmann, and Hubenthal). 1987.
Hubert, E. E. 1882.
Hudelson, R. R. (Miller, M. F., and Hudelson). 14.
Hudig, J. 317.
Hudson, L. *1166.
Huebner, J. *853.
Huelsen, W. A. 574.
Humbert, E. E. 1328.
Humphrey, C. J. (Kress, O., and Humphrey). 1314.
Humphrey, C. J. (Kress, O., Humphrey, and C. A. Richards). 1315.
Hunt, T. F. 216.
Hutchinson, H. B. (Bewley, W. F., and Hutchinson). 1251.
Hutchinson, J. (Phillips, E. P., and Hutchinson). 365.
Hutchison, C. B. 1719.
Huxley, J. S. 532.

Iglesias, R. M. 1764.
Iniguez, I. F. 1765.
Inman, O. L. 290.
Ireland, *A.* *1096.
Irwin, M. *291.
Isaacs, E. (Rowan, W., E. Wolff, P. L. Sulman, K. Pearson, Isaacs, E. M. Elderton, and M. Tildesley). *121.*
Ise, J. 43.
Itano, A., and J. Neill. 292.

J., J. 592.
Jackson, B. D., and S. Moore. 1555.
Jackson, H. H. T. 97.
Jackson, H. S. (Mains, E. B., and Jackson). *667.
Jackson, H. S., and E. B. Mains. *200.
Jacob, J. 1058, 1556, 1557.
Jacobsen, J. P., and M. Knudsen. *1366.
Jahandiez, E. 158, 1420.
Jameson, F. W. 1635.
Janchen, E. 683, 684.
Janet, C. 593.
Jansen, P. 605.
Jansen, P., and W. H. Wachter. 832, 833.
Jassoy, A. 975.
Jeffrey, E. C. 98.
Jenkins, J. M., (Tisdale, W. H., and Jenkins). *698.
Jenks, A. R. *566.
Jennings, H. S. 533.
Jennings, O. E. 606.
Jepson, W. L. *834.
Jessen, K. 1266.
Jimenez, F. W. 1766.
Johann, H. (Dickson. J. G., Johann, and G. Wineland). *677.
Johnson, A. G., and R. W. Luekel. *685.
Johnson. A. M. *36.
Johnson, E. 998.
Johnson, J. *245.
Johnson, R. (Eddy, W. H., H. R. Heft, H. C. Stevenson, and Johnson). 1935.
Johnson, T., and J. G. Gilmore. 1267, 1268.
Johnston, R. B. 1167.
Johnstone, R. B. 1216.
Joly, J. 1598.
Jones, D. F. (East, E. M., and Jones.) 1048.
Jones, D. H. 1256.
Jones, H. A. 773.
Jones, L. R. (Walker, J. C., and Jones). *205.
Jones, L. R., and M. M. Williamson. *217.
Jones, L. R., J. C. Walker, and W. B. Tisdale. 99.
Jones, O. 55.
Jones, S. V. H. 1059.
Jones, W. N., and M. C. Rayner. *1601.
Jonesco, S. *270.*
Jordan, D. S. 100.
Jørstad, I. 1199.
Joshi, P. G. (Burns, W., and Joshi). 1807.
Juritz, C. F. 794.
Just, G. *513.

Kaiser G. B. 854, 983, 2058.
Kanda, M. 1720.
Kappert, H. 534.
Karrer, J. L., and R. W. Webb. 1334.
Kashyap, S R. 582.
Kay, J. 56.
Kayser, E. *276, 277, 779,* 1949.
Keeble, F. 567.
Keen, B. A. 795, 796.
Keitt, G. W. *707.
Keller, C. 1558.
Keller, R. 308.
Kellerman, K. F. 956.
Kellogg, R. S. 57.
Kelsey, H. P. 1109.
Kempton, J. 1060.
Kendall, A. I., M. Cook, and M. Ryan. 1257.
Kendrick, J. B. (Gardner, M. W., and Kendrick). *679, 1880, 1881.
Kendrick, J. B. (Melhus, L. E., J. C. Gilman, and Kendrick). 712.
Kenoyer, L. A. 355, *777, 945.

Kephart, L. W. (Pieters, A. J., and Kephart). 401.
Kern, F. D. 1559.
Key, W. *550.
Khadilker, T. R. *356.
Kidd, F. (West, C., G. E. Briggs, and Kidd). 296.
Kidd, W. *546.
Kidston, R., and W. H. Lang. *636, *648.
Kienitz, M. 1636, 1637.
Kilker, C. H. (McCord, C. P., Kilker, and D. K. Minster). 728.
King, L. Y. (Mrs. F. King). *1168, *1780.
Kinman, C. F. 1797.
Kinney, E. J., and G. Roberts. 897.
Kiörbie, F. (Götsche, O., Kiörbie, C. Bistrup, and C. W. Ahlefeldt-Laurvig). 51.
Kirby, R. S. (Stakman, E. C., Kirby, and A. F. Thiel). *188.
Kirchner, O. von. 1560.
Kirkpatrick, W. F. (Harris, J. A., Kirkpatrick, A. F. Blakeslee, D. E. Warner, and L. E. Card). 1056.
Klason, P. 760, 761.
Klatt, B. 101.
Klebahn, H. 621.
Kloos, A. W., Jr. 835.
Knapp, A. W. *157.
Knapp, M. D. (Grantham, J., and Knapp). *1037, 1054.
Knapp, M. D. (Bishop, O. F., J. Grantham, and Knapp). *1037.
Knesebeck, von. 1638.
Knight, H. H. 1245.
Knowlton, C. H. 326.
Knowlton, C. H., and W. Deane. 327.
Knowlton, F. H. *1269, 1270.
Knowlton, F. H. (Lee, W. T., and Knowlton). 654.
Knuchel, H. 2027.
Knudsen, M. (Jacobsen, J. P., and Knudsen). *1366.
Knudsen, M. (Oxner, M., and Knudsen). 1446.
Knunker, A. 1561.
Knuth, R. 1912, 1913.
Kobel, F. 1217.
Köck, G. 708.
Kohler, D. *753, 762.
Kohn-Abrest, É. 1938.
Kopeloff, N., and S. Morse. 1347.
Kops, J., F. W. van Eeden, and L. Vuyck. *1389.
Kordvahr. 1639, 1640.
Korstian, C. F. 1641.
Koser, S. A. 280.
Kottur, G. L. 535.
Kraemer, H. 1939, 1940.
Krausse, A. 1642, 1643, 1644.
Kraybill, H. R. (Rose, D. H., Kraybill, and R. C. Rose). 1975.
Kress, O., and C. J. Humphrey. 1314.
Kress, O., C. J. Humphrey, and C. A. Richards. 1315.
Kress, O., S. D. Wells, and V. P. Edwardes. 1017.
Krieg, H. 1721.
Krogness, C. 58.
Kronfeld, E. M. 1562.
Krout, W. S. 709.
Krüger, P. 102.
Kruhm, A. 1186.
Kubelka, A. 1018.
Kudo, Y. (Miyabe, K., and Kudo). 329.
Kufferath, H. 1348.
Kuhnert. 1489.
Kuiper, K. 1722.
Kulkarni, L. B. (Burns, W., and Kulkarni). 556.

Lacaita C. C. *1563.
Laibach, F. 622.
Laird, J. S. 784, 785.
Lakon, G. 1723.
Lamon, H. M. 1061.
Lance, R. 233, 234.
Lang, W. A. (Kidston, R., and Lang). *636, *648.
Langdon, LaD. M. *1827.
Langer, H. 1967.
Lansdell, K. A. 1828.
Laplace, F. *1781.
Larsen, T., and C. Mariboe. 422.
LaRue, C. D. *246.
Lasnier. (Fron, and Lasnier). 1212.
Latham, R. O. 271.
Laubert, R. 1218.
Laufer, B. *417.
Laughlin, H. H. 1062, 1724.
Laumonnier-Férard, E. 1782.
LaVarre, W. 1645.
La Vaulx, R. de. [See Vaulx, R. de.]
Lawrence, J. V. (Harris, J. A., R. A. Gortner, and Lawrence). 256, 745.
Leach, B. R. 1373.
Leach, B. R., and J. W. Thomas. 1374.
Leclerc, H. 1564, 1565, 1566.
Lecomte, H. 1421, 1422, 1423.
Lee, H. A. 1287.
Lee, H. A., and M. G. Medalla. 1276.
Lee, W. T., and F. H. Knowlton. 654.
Leendertz, C. J. 1883.
Lehmann, E. 10, 1745.
Leitch, I. 1726.
Lemmermann, O. (Bornemann, Lemmermann, Gerlach, and F. Riedel). 1459.
Lemon, J. S. 786.
Lendner, A. 1567.
Lenz. *536, *537, *538, *539.
Lenz, F. 103, 1727.
Le Plastrier, C. M. *1442.
Lerena, C. A. 1914.
Lesage, P. 957, 1839.
Lesourd, F. *568, *1783.
Lesourd, F. (Martinet, H., and Lesourd). 1571.
Lester-Garland, L. V. 836.
Letacq, A. 1784.
Leukel, R. W. (Johnson, A. G., and Leukel). *685.
Levene, P. A. *1950.
Levine, C. O. 1728.
Levy, F. *449, 771.

Lewis, R. D. (Noll, C. F., and Lewis). 1492.
Licent, E. 450.
Liechti, P., and E. Ritter. 898.
Liese, J. 1968.
Lilienfeld, F. 1063.
Lillie, R. S. *309, 1443.
Lindet, M. L. *1349.
Lindman, C. A. M. *823.
Lindner, P. (Euler, H., and Lindner). *759.
Lindsay, H. A. F., and C. M. Harlow. 1646.
Lindstrom, E. W. *526, 1064.
Linton, A. W. 929.
Lipman, J. G. 1995.
Lipman, J. G., and A. W. Blair. 1375.
Lippincott, W. A. 1065, 1729.
Litardière, R. de. 451.
Little, C. C. 540.
Little, C. C., and M. Gibbons. 104.
Little, L. G. 11.
Llewelyn, W. C. 59.
Lloyd, C. G. 1219, 1220, 1221, 1222.
Lobo, B. 423.
Lochhead, W. 235, *1316.
Locy, W. A. 1568.
Loeb, J. 257, 258, 259, 260, 261.
Lomen, G. J. 1066.
Long, B. 984.
Longo, B. 1191.
Lönnberg, E. 105.
Lopéz, C. 1767.
Lopriore, G. 774.
Lotsy, J. P. 1730.
Love, H. H., and W. T. Craig. 1731.
Luisier, A. 1840.
Lumière, A., and H. Couturier. 310.
Lundborg, H. *538.
Lush, J. L. 1067.
Lutman, B. F. *1921.
Luyten, I. 294.
Lyman, G. R. 930.
Lynn, M. J. (Small, J., and Lynn). 301.
Maas, J. G. J. A. *1037, 1068.
McAtee, W. L. 357.
MacBride, E. W. 541, *649.
McCall, A. G., and J. R. Hoag. 1362.
McCallum, A. W. 27.
McCann, C. (Blatter, E., F. Hallberg, and McCann). 819.
McClintock, J. A. *196, *236.
McCord, C. P., C. H. Kilker, and D. K. Minster. 728.
McCubbin, W. A. *186.
McCullock, L. 1294.
McDonald, A. H. E. 899.
MacDougal, D. T. 264, 747, 772, 1351.
MacDougal, D. T., and E. B. Working. 1352.
McFarland, F. T. *201.
McFarland, F. T. (Seymour, E. K., and McFarland). *187.
McGill, J. 900.
MacIntire, W. H. 1996.
MacIntire, W. H. (Mooers, C. A., and MacIntire). 1997.
McKechnie, H. *837, *838.
Mackie, W. W., and F. N. Briggs. *237.
McKinney, H. H. *686.
McMillen, P. R. (Alway, F. J., McMillen, and C. O. Rost). 1978.
McMiller, P. R. 396.
McNaught, J. B. 594.
McRostie, G. P. 106.
McTaggart, A. 1376.
Magalhaes, B. de. 424.
Magaña, J. B. 1808.
Magrini, G. *1444.
Maiden, J. H. 12, 358, 901, 1424, 2028.
Mains, E. B. (Jackson, H. S., and Mains). *200.
Mains, E. B., and H. S. Jackson. *667.
Maire, L. (Bourdot, H., and Maire). *1207.
Maire, R. (Duvernoy, A., and Maire). 1209.
Malone, J. Y. 107.
Maney, T. J. (Bakke, A. L., W. A. Radspinner, and Maney). 152.
Mangenot, G. 595, 596.
Mangin, L. 931.
Mangin, L., and F. Vincens. 1223.
Manson. 1732.
Manuel, H. L. *159, 1317.
March, L. 1069.
Marchand, B. de C. 318.
Marchmay, T. A. 2059.
Mariboe, C. (Larsen, T., and Mariboe). 422.
Marsden-Jones, E. *809.
Marshall, R. E. *1070.
Martell. 1569.
Martin, E. A. 2060.
Martin, J. N. *34, *431, 1600, *1601.
Martin, W. 2009.
Martin, W. H. *710.
Martinet, H. 1570.
Martinet, H., and F. Lesourd. 1571.
Marty, P. (Vaulx, R. de la, and Marty). 656.
Mathews, J. M. *853.
Mathews, J. W. 1785.
Mathieu, E. H. 902, 903.
Matsumura, J. 328.
Mattirolo, O. 932.
Maublanc, M. 1224.
Maurizio, A. 382.
Maxon, W. R. 813, 814, 815.
Mayer, A. (Samec, and Mayer). 274.
Mayor, E. 1225.
Mazarin. 1768.
Medalla, M. G. (Lee, H. A., and Medalla). 1276.
Melchers, L. E. *218, *668.
Melhus, I. E. *687, *711.
Melhus, I. E., J. C. Gilman, and J. B. Kendrick. 712.
Melle, H. A. 1490.
Mellon, R. R. 1071.
Mellon, R. R. (Acree, S. F., Mellon, P. M. Avery, and E. A. Slagle). 311.
Mellon, R. R., S. F. Acree, P. M. Avery, and E. A. Slagle. 262.
Mendiola, N. B. 650.

Mensio, C. (Caudo, A., and Mensio). 740.
Menzel, P. 1850.
Mereschkovsky, C. 1246.
Merkel. 13.
Merrill, E. D. 359, 360.
Merrill, F. A. *436, *437, *438.
Metz, C. W. *110.
Meunissier, A. (Vilmorin, J. de., and Meunissier). 1187.
Meunissier, E. *176.
Meylan, C. 1841, 1842.
Mezger, C. 1986.
Micheels, H. 754.
Michel-Durand, E. *797.
Miège, E. *688.
Mieli, A. 1572.
Millard, W. A. 397, 689.
Miller, E. C. 751.
Miller, E. J., and C. S. Robinson. 1377.
Miller, M. F. (Duley, F. L., and Miller). 316.
Miller, M. F., and R. R. Hudelson. 14.
Miller, W. L. 787.
Millet, L. 167.
Millspaugh, C. F. (Britton, N. L., and Millspaugh). *322, *1999.
Millton, E. B. 904.
Milsum, J. N. 1181.
Miner, J. R. (Pearl, R., J. W. Gowen, and Miner). 113.
Minor, J. E. 763.
Minster, D. K. (McCord, C. P., C. H. Kilker, and Minster). 728.
Mirande, M. 251, 281.
Mirande, R. 1226.
Mitchell, S. B. *1169.
Miuri, M. 1861.
Miyabe, K., and Y. Kudo. 329.
Miyake, C. (Nishikado, Y., and Miyake). 1318.
Mizusawa, I. 1884.
Mogensen, A. (Weaver, J. E., and Mogensen). 963.
Mohr, O. L. *124.
Mohr, O. L., and C. Wriedt. *539.
Moir, W. S. 1277.
Mol, W. E. de. 1072.
Moll, F. 788.
Möller. 1599.
Molliard, M. 306, 690.
Monaco, A. de. 1445.
Monckton, H. W. *489.
Monteith, J. Jr., *202.
Montemartini, L. 1295.
Moodie, R. L. 1271.
Mooers, C. A., and W. H. MacIntire. 1997.
Moonaw, S. B. and C. B. Sherman. *569.
Moore, B[arrington]. 958.
Moore, B[enjamin]. 755.
Moore, B., C. C. Adams, T. L. Hankinson, G. P. Burns, and N. Taylor. *985.
Moore, C. R. 1073.
Moore, S. (Jackson, B. D., and Moore). 1555.
Moore, S. LeM. 2029.
Moral, A. 425.
Moreau, F. 1227.
Moreau, F., and Mme. Moreau. 627.
Moreau, Mme. (Moreau, F., and Mme. Moreau). *627.
Morel, F. 168.
Moreland, C. C. (Edgarton, C. W., and Moreland). 1293.
Morellet, J. (Morellet, L., and Morellet). 651.
Morellet, L., and J. Morellet. 651.
Morettini, A. 661.
Morgan, T. H. 1733.
Morgan, T. H., A. H. Sturtevant, and C. B. Bridges. 108.
Morgulis, S. 1955.
Morlot, R. (Hochè, L., and Morlot). 1716.
Morris, H. E., and D. B. Swingle. *219.
Morris, R. T. *1110.
Morrow, C. A. *1332.
Morse, S. (Kopeloff, N., and Morse). 1347.
Morse, S. F. 905.
Morse, W. J. 906, 933.
Morstatt, H. 439.
Mortimer, A. 1573.
Moss, C. E. *335.
Mottet, S. 169, 170, 1786, 1787.
Moxley, G. L. 628.
Mudge, C. S. (Ayers, S. H., P. Rupp, and Mudge). 1250.
Mueller, M. L. *1647.
Müller. 1648, 1649.
Muller, H. J. 109, *1043.
Muller, H. J., and E. Altenburg. *1043.
Munerati, O. 1353.
Munns, E. N. 60.
Murrill, W. A. *986.
Muscatello, G. (Buscalioni, L., and Muscatello). 1401.
Muszynski, J. 729.
Muttkowski, R. A. 1363.

Nachtsheim. *110.
Naganaski, H. (Saito, K., and Naganaski). *1744.
Nagel, K. (Gothan, W., and Nagel). 1265.
Navarro, B. G. 1491.
Naveau, R. 607.
Nechleba, A. 1019, 1020.
Neger, F. W. (Dusén, P., and Neger). 1823.
Neill, J. (Itano, A., and Neill). 292.
Nelson, J. C. 987, 988, 989, 1650.
Nelson, R. *197.
Nelson, R. (Coons, G. H., and Nelson). 211.
Newcomb, E. L., C. H. Rogers, and C. W. Folkstad. 1915.
Newton, M. 1283.
Neyraut, E. J. 361.
Nicholls, W. D., and F. W. Peck. 398.
Nichols, G. E. 976, 1600.
Nichols, H. J. 293.
Nicholson, W. E. 608, 990.
Nightingale, G. T. (Gourley, J. H., and Nightingale). 1107.
Nishikado, Y., and C. Miyake. 1318.

Niswonger, H. R. 570.
Noack, K. L. *111.
Noll, C. F., and R. D. Lewis. 1492.
Northrop, J. H. 282, 1346.

Oakley, R. A. 1574.
Oakley, R. A., and H. L. Westover. 399.
O'Brien, D. G. (Berry, R. A., and O'Brien). 1679.
Oertzen, von. 1651.
Offner, J. 991.
Ohshima, H. 112.
O'Kane, W. C. 1111.
Okkelberg, P. 1074.
Oliver, G. D. *1652.
Olmsted, F. E. 61.
Onslow, H. *521.
Onslow, M. W. *252, *1332.
Opazo, A. 1788.
Orton, C. R. (Thurston, H. W., Jr., and Orton). 1299.
Orton, C. R. (Weiss, F., and Orton). *198.
Osterhout, W. J. V. 1364.
Osterhout, W. J. V., R. Thaxter, and M. L. Fernald. 934.
Ostwald, W. 254, *741.
Ostwald, W., and P. Wolski. *742.
Oxner, M., and M. Knudsen. 1446.

Palma, S. di. 855.
Pammel, L. H. 1575.
Pantanelli, E. 713, 856, 999, 1288, 1903.
Parde, M. 662.
Parish, E. 1493.
Parish, S. B. 992.
Parisi, R. 1228.
Parker, W. H., and H. Chambers. *400.
Parkin, J. 775.
Parrott, P. J. 1897.
Pate, W. F. (Williams, C. B., Pate, E. C. Blair, and R. W. Collett). 410.
Patouillard, N. 1229, 1230.
Patty, F. A. 272.
Pau, C. 2006.
Paulson, R. 1247, 1248.
Pavillard, J. 597, 598.
Payne, F., and M. Denny. 1734.
Peachey, G. C. 1576.
Peacock, B. L. DeG. (Peacock J. C., and Peacock). 1916.
Peacock, J. C., and B. L. DeG. Peacock. 1916.
Pearl, R. 114, 115, 1735.
Pearl, R., J. W. Gowen, and J. R. Miner. 113.
Pearsall, W. H. *1425.
Pearse, A. S. 2061.
Pearson, A. A. 1231.
Pearson, C. E. 116.
Pearson, K. (Rowan, W., E. Wolff, P. L. Sulman, Pearson, E. Isaacs, E. M. Elderton, and M. Tildesley). 121.
Pearson, R. S. 1653.
Pearson, W. H. 609.
Pease, R. N., and H. S. Taylor. 283.
Peck, F. W. (Nicholls, W. D., and Peck). 398.
Peju. (Guilliermond, A., and Peju). 1215.
Pellegrin, F. 1426, 1427.
Pelseneer, P. *142.
Pennell, F. W. 362, 839, 2030, 2031.
Pennington, L. H., W. H. Snell, H. H. York, and P. Spalding. 1319.
Pennington, S., and H. G. Robinson. 1320.
Percival, J. *440.
Petch, C. E. 238.
Petch, T. 330, 1232, 1233.
Peters, R. A. 1927, 1928, 1941, 1974.
Petri, L. 1192.
Petrie, D. 2032.
Petrie, W. M. F. 415.
Petronievics, B. *652.
Petry, E. J. (Scott, W. R. M., and Petry). 503.
Peyronel, B. 623, 1234.
Pézard, A. 1736, 1737.
Pfeiffer, H. 363, 2033.
Phillips, E. P. 364, 471.
Phillips, E. P., and J. Hutchinson. 365.
Phillips, J. C. 1738.
Pieters, A. J., and L. W. Kephart. 401.
Pimental, A. 1809.
Pinelle, J. 171, 1289.
Pinn, A. J. 1739.
Pinoy, P. E. 1075.
Piper, C. V. 366, 907.
Pirotta, R. *935, 1258.
Pitt, F. 1740.
Pittier, H. 2034, 2035.
Plahn, A. 1076.
Platt, E. E. 2062.
Plumb, C. S. 117.
Plummer, J. K. 1998.
Poisson, H. 1428.
Poisson, H. (Caille, O., and Poisson). *1402.
Pole Evans, I. B. *334, 367, 2036.
Politis, J. 452, 453.
Poll, H. *514.
Pomeroy, C. S. 1741.
Pomona. 118.
Poole, R. F. *691.
Popenoe, P. *542, *1077, *1078, *1079.
Popenoe, W. 1080, 1769.
Popp, M. 15.
Porte, W. S. (Pritchard, F. J., and Porte). 663.
Porter, E. E. (Weiser, H. B., and Porter). 265.
Porter, R. H. *239.
Pöschl, V. 744.
Posey, G. B. (Bethel, E., and Posey). *673.
Potier de la Varde, R. 1843, 1844, 1845.
Potonié, R. *1851.
Potter, G. F. 575.
Potter, M. C. 284, 381.
Pottier, J. 610.
Potts, F. A. *454.
Poupion, J. 172, 173.
Povah, A. H. W. *220, 1296.
Powers, E. B. 959.
Prain, D. 1577, 1578.
Pratt, H. E. 1494.
Preiss, F. (Blanck, E., and Preiss). 1980.
Prell, H. 1742.
Presti, N. 1810.
Price, W. A. 714.

Priestley, J. H. 263, 273.
Pringsheim, E. G. 1977.
Pritchard, F. J., and W. S. Porte. 663.
Proschowsky, A. R. 1789.
Prouty, W. F. 1193.
Provasi, T. 1194.
Pryer, R. W. (Walker, W. F., and Pryer). 1973.
Pugsley, H. W. 368, *840, 2037, 2038, 2039.
Puig, J. 1495, 1496, 1811, 1898.
Pujiula, J. 1829.
Putterill, V. A. 1862.
Puviliand, J. *174.
Puxeddu, E., and F. Vodret. 1331.

Quaintance, A. L. 1899.
Quairière, C. J. 1654.
Quanjer, H. M., and J. O. Botjes. 1885.
Quevado, J. M. 1917.
Quin, H. G. 1497.

R., A. B. *1601, *1602.
R., E. *1655.
Rader, F. E. 1498.
Radspinner, W. A. (Bakke, A. L., Radspinner, and T. J. Maney). 152.
Ragionieri, A. 1790.
Rahman, A. 908.
Ramaley, F. 472, 473.
Ramiréz, R. 1863, 1864, 1886.
Ramsbottom, J. 1235, 1236, *1259.
Rand, F. V., and L. C. Cash. 203.
Randall, S. B., and I. C. Hall. 1956.
Rao, P. S. J. 1872.
Rap, C. W. 221.
Ratzer, W. von. 402.
Ravenna, C. (Ciamician, G., and Ravenna). 1341, 1342, 1361.
Rawes, R. N. *510, 1743.
Rawitscher. *1744.
Rayner, M. C. (Jones, W. N., and Rayner). *1601.
Rea, C. 1237.
Rea, M. W. (Small, J., and Rea). 300.
Read, J. W. (Sure, B., and Read). 1951.
Recknagel, A. B. *1656.
Recknagel, A. B., and J. Bentley, Jr. 43.
Reddy, C. H. *669.
Regnier, M. *756.
Rehder, A. 369, 370, 371.
Reid, G. A. 119.
Reinheimer, H. *122, 1964, 1966.
Reinking, O. A. 1278.
Rendle, A. B. (Fawcett, W., and Rendle). 346, 2020.
Renner, O. *1745.
Renson, C. 1499, 1500.
Richards, B. L. *204, *692.
Richards, C. A. (Kress, O., C. J. Humphrey, and Richards). 1315.
Richthofen, von. 1501, 1502.
Ricôme. *841.
Riddelsdell, H. J. 842.
Riddle, O. 120.
Riedel, F. (Bornemann, O. Lemmermann, Gerlach, and Riedel). 1459.
Rignano, E. *857.
Riker, A. J. 455.
Rindl, M. 1502, 1503, 1657.
Rios, A. G. (Canfield, F. D., and Rios). 881.
Ritter, E. (Liechti, P., and Ritter). 898.
Ritzema Bos, J. 1579, 1865, 1900.
Rivera, V. 693.
Riveros, E. 1770.
Rivett, M. F. *456.
Rivière, G., and G. Bailhache. *1112.
Rivoire, A. 1791.
Robbins, W. W. *222.
Roberts, E. 1081.
Roberts, G. (Kinney, E. J., and Roberts). 897.
Roberts, H. F. 403.
Roberts, J. W. 426, 1284.
Robinson, C. S. (Miller, E. J., and Robinson). 1377.
Robinson, H. G. (Pennington, S., and Robinson). 1320.
Robison, W. L. 909.
Rodríguez, S. 1504.
Roemer, T. 910, *911.
Roessler. 1658.
Rogers, C. H. (Newcomb, E. L., Rogers, and C. W. Folkstad). 1915.
Roig, J. T. *62.
Rolet, A. 175.
Rolfe, R. A. *824.
Rolfs, F. M. 160.
Root, A. I. 16, 17.
Roper, I. M. *1394.
Rosa, J. T., Jr. 778.
Rose, D. H., H. R. Kraybill, and R. C. Rose. 1975.
Rose, J. N. (Britton, N. L., and Rose). 340, 1400.
Rose, M. 1200.
Rose, R. C. (Rose, D. H., H. R. Kraybill, and Rose). 1975.
Rosen, H. R. *694.
Rossi, G. de. 624.
Rost, C. O. (Alway, F. J., P. R. McMillen, and Rost). 1978.
Roster, G. 1580.
Roth, E. 382.
Rowan, W., E. Wolff, P. L. Sulman, K. Pearson, E. Isaacs, E. M. Elderton, and M. Tildesley. 121.
Ruby, M. J. 1505.
Rudkin, S. 18.
Rümker. 404.
Ruml, B. (See Fernald, M. R., M. H. S. Hayes, and A. Dawley). 1049.
Rupp, P. (Ayers, S. H., Rupp, and C. S. Mudge). 1250.
Russell, E. J. 1581.
Russell, W. 474.
Ryan, H. 2063.
Ryan, M. (Kendall, A. I., M. Cook, and Ryan). 1257.

S., J. *1976.
Saccardo, P. A. *1238, 1239.

Saez, D. 1771.
Safford, W. E. 543, 1082, 2040.
St. John, H. (Fernald, M. L., and St. John). 349.
Saito, K., and H. Naganaski. *1744.
Sakurai, M. 1297.
Salaman, R. N. *405.
Salisbury, E. J. *122, *331.
Salisbury, E. J. (Fritch, F. E., and Salisbury). 32.
Salmon, C. E. 2041.
Salmon, E. S. 695.
Salt, H. 63, 64.
Samaan, K. 730.
Samec, and A. Mayer. 274.
Sampaio, A. J. de. 427.
Samuelsson, G. 993.
Sanchez, N. 1798.
Sanders, G. E. *1321.
Sando, C. E., and H. H. Bartlett. 1942.
Sandwith, N. Y. 332.
Sarabia, G. 1772, 1773.
Sargent, C. S. 372.
Sargent, O. H. 843.
Sartory, A., and P. Bailly. 307.
Saunders, C. E. 19.
Saunders, E. R. 1746.
Sauvageau, C. 1000, 1201.
Savelli, R. 1083, 1747.
Sayre, L. E. 406.
Scasso, J. M. 1506.
Schade, H. *748.
Schaeffer, A. A. *733.
Schaffnit, E. 715.
Schipper, W. W. *2064.
Schlechter, R. 490.
Schlechter, R., and F. C. Hoehne. 1429.
Schmidt, E. W. 1378.
Schmidt, J. 1748.
Schmitt, C. *441, *442.
Schmitz, H. (Cook, I. W., Schmitz, and L. A. Grant). 507.
Schmitz, H., and A. S. Daniels. 509.
Schnaase. 1659.
Schoevers, T. A. C. 1866.
Schopmeyer, C. H. *443.
Schrader, F. 123.
Schröder, B. 1202.
Schröder, H. 1660.
Schroeder. 544.
Schryver, S. B. (Chibnall, A. C., and Schryver). 1948.
Schubert. 1507.
Schubert, J. 1661.
Schuchert, C. 653.
Schultz, E. F. 1508, 1509, 1510, 1887.
Schultz, E. S. 1888.
Schulz, A. 1511.
Schürhoff, P. N. 1084.
Schwappach. 1662.
Schwappach, A. 946.
Schweizer, K. *1350, *1365.
Scofield, C. S., and F. B. Headley. 798.
Scott, D. H. *633, *655.
Scott, L. B. 1113.
Scott, W. R. M., and E. J. Petry. 503.
Scully, R. W. *806.
Sears, P. B. 1195.
Secrest, E. 1021.
Sedgwick, L. J. 844.
Seelen, von. 1663.
Seelhorst, C. von., W. Geilmann, and H. Hubenthal. 1987.
Seidell, A. 312.
Seiler, J. *124, 544.
Selby, A. D., and R. C. Thomas. 1298.
Sell, M. T. (Steenbock, H., Sell, and P. W. Boutwell). 1943.
Sell, M. T. (Steenbock, H., Sell, and M. Buell). 1944.
Semichon, L. 1512.
Sen-Gupta, N. N. 1379.
Setchell, W. A. 977, 994.
Setchell, W. A., T. H. Goodspeed, and R. E. Clausen. 1085.
Severin, G. 1664, 1665, 1666.
Severin, H. H. P. 1322.
Seward, A. C. *645, 654, *655.
Seymour, E. K., and F. T. McFarland. *187.
Shamel, A. D. 125, 126, 127, 1086.
Sharp, L. T. (Waynick, D. D., and Sharp). *797.
Sharp, L. W. *457.
Shaw, W. R. 599.
Shepherd, A. N. 20.
Shepherd, J. F. *1022.
Sherman, C. B. (Moomaw, S. B., and Sherman). *569.
Sherwin, M. E. 1513.
Shoolbred, W. A. *324.
Showalter, A. M. 1830.
Shreve, E. B. *960.
Shreve, F. 475.
Shull, C. A. 978.
Siebert, A. 1582.
Siecke, E. O., and L. Wyman. 1667.
Siegmund, G. 407.
Silveira, R. S. 1514.
Sim, T. R. 1668, 1669.
Simmonds, J. H. 1023.
Simonds, O. G. 1792.
Sinnott, E. W. (Harris, J. A., and Sinnott). 182.
Skinner, J. J. 319.
Slagg, C. M. *223.
Slagle, E. A. (Acree, S. F., R. R. Mellon, P. M. Avery, and Slagle). 311.
Slagle, E. A. (Mellon, R. R., S. F. Acree, P. M. Avery, and Slagle). 262.
Slogteren, E. van. 1901.
Slosson, E. E. 380.
Small, J. 298, 299, *642, *1595, *1602.
Small, J., and M. J. Lynn. 301.
Small, J., and M. W. Rea. 300.
Small, J. K. 491, 492.
Smiley, E. M. (Artschwager, E., and Smiley). 1438.
Smith, A. L. *629.
Smith, E. F. *244, 664.
Smith, E. F., and G. H. Godfrey. 224.
Smith, G. M., and G. N. Hoffer. *716.
Smith, R. S. 1380.

Smythies, E. A., and S. H. Howard. 65.
Snell, W. H. 66, 1240.
Snell, W. H. (Pennington, L. H., Snell, H. H. York, and P. Spalding). 1319.
Snodgrass, M. D. 1515, 1516.
Soest, J. L. 845.
Söhngen, N. L. (Verkade, P. E. and Söhngen). 1945.
Solis, O. 1583.
Sosman, R. B. *1603.
Souèges, R. 183.
South, F. W. 1279, 1867.
Spalding, P. (Pennington, L. H., W. H. Snell, H. H. York, and Spalding). 1319.
Spierenburg, D. 696.
Sprague, T. A. *810.
Sprecher, A. 749.
Staf, H. 67, *68.
Stakman, E. C., R. S. Kirby, and A. F. Thiel. *188.
Standley, P. C. 1087, 1430.
Stark, L. C. 1114.
Stark, P. 1969.
Steele, A. 1170.
Steele, F. *1171.
Steenbock, H. (Hart, E. B., Steenbock, and C. A. Hoppert). 1926.
Steenbock, H., M. T. Sell, and P. W. Boutwell. 1943.
Steenbock, H., M. T. Sell, and M. Buell. 1944.
Steil, W. N. *1045.
Steinmann, G. 1272.
Stent, S. M., and H. A. Melle. 1517.
Stephenson, T., and T. A. Stephenson. 373, 2042, 2043, 2044.
Stephenson, T. A. (Stephenson, T., and Stephenson). 373, 2042, 2043, 2044.
Stevens, F. L. 247, *697, *1291.
Stevenson, H. C. (Eddy, W. H., H. R. Heft, Stevenson, and R. Johnson). 1935.
Stevenson, J. A. 1323.
Stiles, E. C. 1172.
Stoa, T. E. 912.
Stoate, T. N. 69.
Stoddard, L. 1079.
Stone, R. E. 1280.
Stout, A. B. 128, 129.
Stout, M., and M. Agar. 164.
Strand, E. *1904.
Sturtevant, A. H. 130, 131, 132, *1705.
Sturtevant, A. H. (Morgan, T. H., Sturtevant, and C. B. Bridges). 108.
Sturtevant, G. 1088.
Suessenguth, K. 1831.
Sulman, P. L. (Rowan, W., E. Wolff, Sulman, K. Pearson, E. Isaacs, E. M. Elderton, and M. Tildesley). 121.
Sundaraman, S. *617.
Sure, B., and J. W. Read. 1951.
Swain, E. H. E. 70.
Swartwout, H. G. 161.
Swingle, D. B. (Morris, H. E., and Swingle). *219.

T., C. 1584.
T., E. N. 460.
T., W. B. *493.
Täckholm, G. *135.
Takimoto, K. 1889.
Tansley, A. G. *1089.
Tate, G. 731.
Taylor, H. S. (Pease, R. N., and Taylor). 283.
Taylor, H. W. 1518, 1519.
Taylor, M. A. 374.
Taylor, N. 494.
Taylor, N. (Moore, B., C. C. Adams, T. L. Hankinson, G. P. Burns, and Taylor). *985.
Teichmann. 1024.
Terby, J. 545.
Teschauer, C. 428.
Tevis, M. 1812.
Thadani, K. I. 133, 1090.
Thatcher, L. E. 913.
Thaxter, R. (Osterhout, W. J. V., Thaxter, and M. L. Fernald). 934.
Theiss, L. E. 1173.
Thériot, I. 611, 612, 1846.
Thiel, A. F. (Stakman, E. C., R. S. Kirby, and Thiell). *188.
Thiessen, A. H. 461.
Thjotta, T., and O. K. Eide. 1091.
Thoday, M. G. 1832.
Thomas, H. H. *495.
Thomas, J. W. (Leach, B. R., and Thomas). 1374.
Thomas, M. D. 1381.
Thomas, P. (Bertrand, G., and Thomas). 255.
Thomas, P. H. 1115, *1116, 1117, *1118, 1119.
Thomas, R. C. (Selby, A. D., and Thomas). 1298.
Thompson, H. C. 576.
Thompson, H. S. 2045.
Thompson, N. F. *670.
Thomson, J. A. *546, *1092.
Thorne, C. E. 914, 915, 916.
Thurston, H. W., Jr., and C. R. Orton. 1299.
Tice, C. 1520.
Tiebout, G. L. (Edgerton, C. W., and Tiebout). 1308.
Tiffany, L. H. 600.
Tildesley, M. (Rowan, W., E. Wolff, P. L. Sulman, K. Pearson, E. Isaacs, E. M. Elderton, and Tildesley). 121.
Tischler, G. *134, *135.
Tisdale, W. B. *226.
Tisdale, W. B. (Jones, L. R., J. C. Walker, and Tisdale). 99.
Tisdale, W. B., and M. M. Williamson. *225.
Tisdale, W. H. 1890.
Tisdale, W. H., and J. M. Jenkins. *698.
Tjebbes, K., and J. C. Th. Uphof. 1358.
Tolaas, A. G. 717.
Tonnelier, A. C. 1521.
Torres, A. *1813, 1814.
Torres, L. G. 1522.
Trachtenberg, H. L. 1093.
Traverso, G. B. 936.

Trelease, S. F. 1337.
Trelease, W. 375. 846.
Truffaut, G., and N. Bezssonoff. 320.
Tschermak. 1025.
Tureson, G. 1870.
Turney, A. G. 28.
Turpin, H. W. 1382.
Turrill, W. B. *496, *497, 2046.

Uphof, J. C. T. 136, 699, *1120, 1121, *1122, 1123, 1174.
Uphof, J. C. T. (Tjebbes, K., and Uphof). 1358.

Valencia, F. V. 1026.
Valleau, W. D. *240, 700, *718.
Vallejo, C. 1774.
Varela, E. 1799.
Vargas, L. M. 1800, 1801.
Varney, B. M. 961, *962.
Vasquez, D. 1523.
Vass, A. F. 1354.
Vaughan, R. E. *241.
Vaulx, R. de la. 1725.
Vaulx, R. de la, and P. Marty. 656.
Vayssière, M. P. 248.
Verhoeven, W. B. L. 1902.
Verkade, P. E. 1345.
Verkade, P. E., and N. L. Söhngen. 1945.
Versluys, M. C. 295.
Vierling, K. *1260.*
Vilmorin, J. de. 137.
Vilmorin, J. de., and A. Meunissier. 1187.
Vincens, F. (Mangin, L., and Vincens). 1223.
Vischniac, C. (Goris, A., and Vischniac). 250.
Vles, F. (Dragoiu, J., and Vles). 446.
Vles, F., and J. Dragoiu. 458.
Vodret, F. (Puxeddu, E., and Vodret). 1331.
Voelcker, J. A. 799, 800.
Volkart, A., A. Grisch, and W. Bandi. 917.
Vries, H. de. *547, 548,* *1043

Vuillemin, P. 1241.
Vuyck, L. (Kops, J., F. W. van Eeden, and Vuyck). *1389.

Wachter, W. H. (Jansen, P., and Wachter). 832, 833.
Wachter, W. L. (Castle, W. E., and Wachter). 1691.
Wacker. 21.
Wacker, J. 408.
Wager, H. A. *1833.*
Wagner, P. 1524.
Wahl, von. 1891.
Wainio, E. A. 1242, 1249.
Wakefield, E. M. 1300.
Waldron, L. R. 918.
Walker, J. C. **227, *701.*
Walker, J. C. (Jones, L. R., Walker, and W. B. Tisdale). 99.
Walker, J. C., and L. R. Jones. *205.
Walker, W. F., and R. W. Pryer. 1973.
Wall, A. 2047.
Waller, A. D. 1923.
Waller, A. D., and Mrs. A. D. Waller, F. O'B. Ellison, and T. B. Farmer. 750.
Waller, Mrs. A. D. *(Waller, A. D., Waller, F. O'B. Ellison, and T. B. Farmer). 750.*
Waller, A. E. 1001.
Wallis, T. E 732.
Ward, C. D. *459.
Ward, E. N. 1124.
Ward, H. A. 995.
Warner, D. E. (Harris, J. A., W. F. Kirkpatrick, A. F. Blakeslee, Warner, and L. E. Card). 1056.
Warner, H. H. 1670.
Warnstorf, C. 613.
Waterlot, and Decary. 2010.
Watson, J. A. S. 138.
Watson, W. *629, 1585.
Waugh, F. A. 1777.
Waynick, D. D., and L. T. Sharp. *707

Weatherby, C. A. 376, 498, 1586.
Weatherby, C. A. (Fernald, C. L., and Weatherby). 350.
Weathers, J. 1094.
Weaver, J. E. *1002.
Weaver, J. E., and A. Mogensen. 963.
Weaver, R. B. 71.
Webb, R. W. (Karrer, J. L., and Webb). 1334.
Webber, H. J. 139.
Weber, G. F. *671.
Weimer, J. L. 719.
Weimer, J. L. (Harter, L. L., and Weimer). 766, 1869.
Weimer, J. L., and L. L. Harter. 764, *1873, 1874.*
Weir, J. R. 1301, 1302.
Weis, F. *753.
Weis, F., and K. A. Bondorff. 665, 1383.
Weiser, H. B., and E. E. Porter. 265.
Weiss, F., and R. B. Harvey. 666.
Weiss, F., and C. R. Orton. *198.
Weiss, H. 1970.
Weiss, H. B. 625, 964, 965, 1525.
Wellington, R. 140, 1125.
Wells, B. W. 1196, 1834.
Wells, S. D. (Kress, O., *Wells, and* V. P. Edwardes). 1017.
Wenholz, H. 919.
Wense, H. von der. 1587.
Werner, H. O. 409.
Werth, E. 657.
West, C., G. E. Briggs, and F. Kidd. 296.
Weston, W. H. *206.
Westover, H. L. (Oakley, R. A., and Westover). 399.
Wheldon, J. A. 614.
Wherry, E. T. 966, 967, 968.
White, C. T. 377.
White, J. W. 2007.
White, J. W., and F. J. Holben. 1988.

White, O. E. 141.
White, W. T. 1526.
Whitehead, T. 1243.
Whitney, M. 1989.
Whittet, J. N. 22.
Whymper, R. *552, *1805.
Wiegand, K. M. 378, 2048.
Wiegner, G. 1990.
Wild, H. *1175, *1176.
Wildeman, E. de. 1431, 1432, 1433.
Wilder, L. D. *1177.
Wilding, E. H. 162.
Willard, J. T. 858.
Wille, J. 789.
Williams, C. B., W. F. Pate, E. C. Blair, and R. W. Collett. 411.
Williams, C. O. 321.
Williams, F. N. 2008.
Williams, R. S. 615.
Williams, S. G. 2065.
Williamson, M. M. (Jones, L. R., and Williamson). *217.
Williamson, M. M. (Tisdale, W. B., and Williamson). *225.
Willis, J. C. 499, *500, *1388.
Willstätter, R. 285.
Wilmore, W. W. 1182.
Wilmott, A. J. 2049.
Wilson, B. D. 1991.
Wilson, E. H. 501.
Wilson, M. 1244.
Wineland, G. (Dickson, J. G., H. Johann, and Wineland). *677.
Wingard, S. A. (Fromme, F. D., and Wingard). 194, *706.
Winge, Ø. *526.
Winge, Ø. (Ferdinandsen, C., and Winge). 1211.
Winters, S. R. 969.
Winterstein, H. *710.
Winton, A. L. 1588.
Wister, J. C. 937.
Wittmack, L. 411.
Witzemann, E. J. 765.
Wolff, E. (Rowan, W., Wolff, P. L. Sulman, K. Pearson, E. Isaacs, E. M. Elderton, and M. Tildesley). 121.
Wolk, B. C. van der. 1815, 1960.
Wollenweber, H. W. 189.
Wolley-Dod, A. H. *847.
Wolski, P. (Ostwald, W., and Wolski). *742.
Woodard, J. *1946.
Woodruff, L. L. 1095.
Woods, F. A. 549, *1096.
Woodward, B. B. *142.
Woodward, R. W. 996.
Woolsey, T. S., Jr. *506.
Wooster, L. C. 429.
Working, E. B. (MacDougal, D. T., and Working). 1352.
Worliczek, C. 1027.
Wriedt, C. (Mohr, O. L., and Wriedt). *539.
Wright, A. E. 1924.
Wright, G. 1835.
Wright, R. C. 1971.
Wright, S. 143, 144, 145, 146, 147, *550.
Wright, W. H. (Fred, E. B., Wright, and W. C. Frazier). 1372.
Wyman, L. (Siecke, E. O., and Wyman). 1667.

Yamaguchi, Y. *1036.
York, H. H. (Pennington, L. H., W. H. Snell, York, and P. Spalding). 1319.
Young, E. G. (Grey, E. C., and Young). 1952.
Young, H. C., and C. W. Bennett. *672.
Youngken, H. W. *941, 1918.
Yuncker, T. G. 848, 997, 2066.

Zahn, E. 1589.
Zaunick, R. 1590.
Zavitz, C. A. *29.
Zeininger. 1591.
Zeleny, C. *1043.
Zenari, S. 502.
Ziegler, A. 148.
Zoller, H. F., and W. M. Clark. 275.
Zschake, H. 630.

2003
4 - JUN 1936